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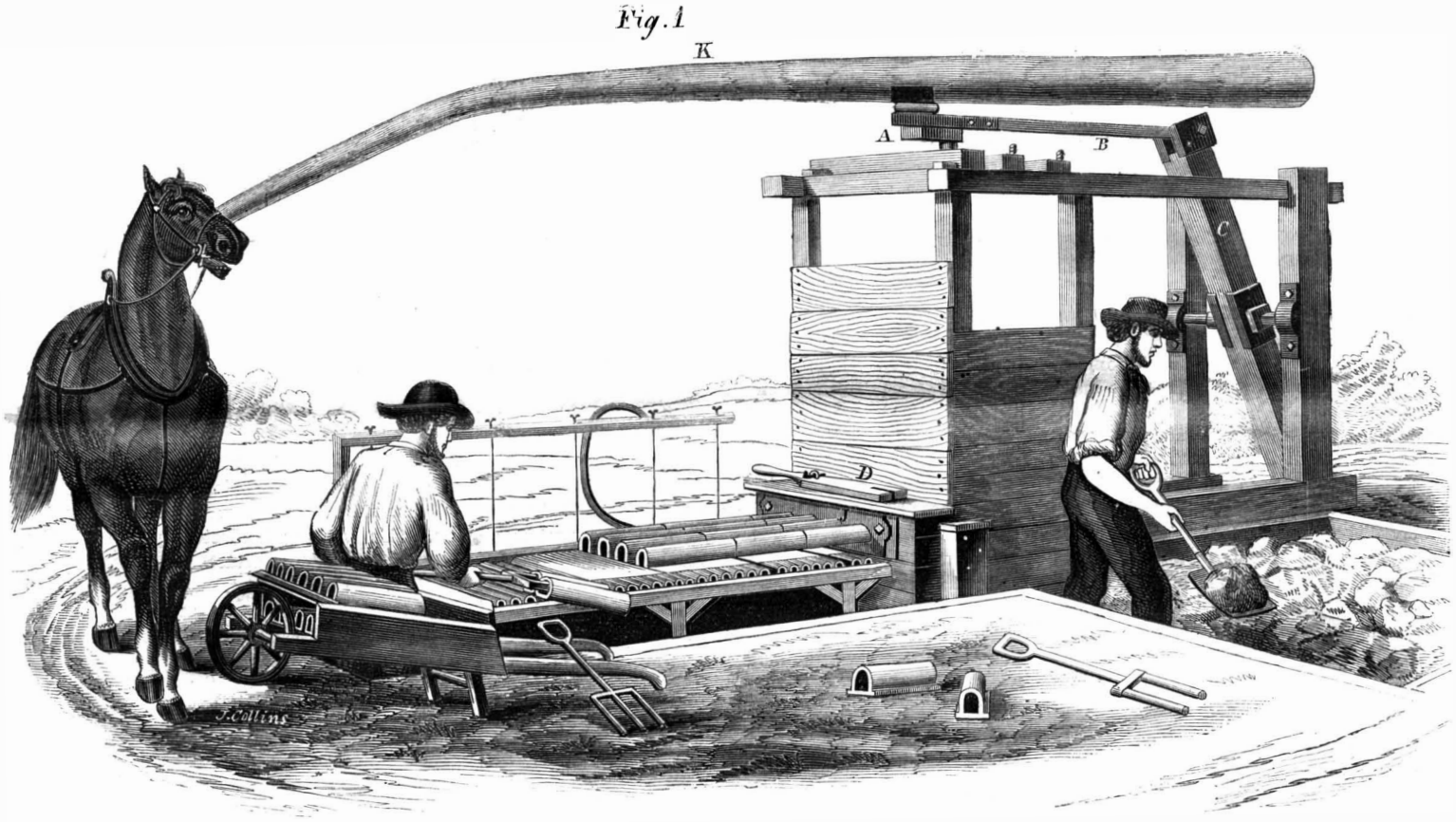
Improved Drain Tile Machine.

The engraving herewith published represents an improved machine for the manufacture of draining or other tiles. The invention consists of so uniting the pugging mill and tile-making machine, that the tile box is self-feeding and the tiles are delivered on

Fig. 1



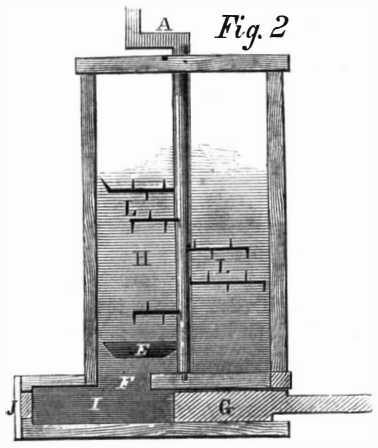
BRAISLIN'S MACHINE FOR MAKING DRAIN TILE.

the rollers as fast as the clay can be sufficiently tempered, and with but little more power than is usually required to temper the clay alone

It will be seen upon examining the engraving that the machine is set in motion by means of the sweep, K, to which the horse is attached, operating upon the cranked shaft, A, which extends down through the pugging reservoir, H, as seen in Fig. 2, and that it is armed with spiked knives, L L, which thoroughly cut and mix the wet clay as it is thrown in, and continuously pass down between them and the forcing blade, E, which causes a portion of the now-tempered clay to pass through the opening, F, into the tile box, I, at every revolution. From the box it is converted into the desired tiles by being forced through the openings in the die plate, J, by the forward motion of the plunger, G; the latter is caused to advance by means of the cranked portion of the shaft, A, operating through the rod, B, upon the lever, C. This lever is connected at its lower end with the stem of the plunger, G. Whenever a stone or other impediment obstructs the free passage of the clay through the openings in the die plate, J, the lid, D, is raised, which permits the attendant to insert his hand and extract it.

The advantages claimed for this machine are its cheapness, simplicity, durability, non-liability to get out of order, and its rapid and cheap delivery of tiles. It is equally adapted to large or small tile works, as its cheapness admits of its introduction when only a few thousands annually are required, while its facility of production is such that large quantities can be placed upon the drying shelves at from one half to one-third the cost per thousand, of those made upon the machines in ordinary use. This machine can be driven by either horse or steam power; it has been in operation nearly two years, and was patented Nov. 3, 1863, by John Braislin, of Burlington, N. J.,

Fig. 2



and assigned by him to Rigg & Braislin, of the same place, where the machine may be seen in operation.

For further information address either the inventor or the firm, as above.

The Ant Trap.

As the season is now at hand for those pests, the ants, housewives and others who are troubled with them may probably use the following trap to advantage:—"Procure a large sponge, wash it well, and press it dry, which will leave the cells quite open; then sprinkle over it some fine white sugar, and place it near where the ants are troublesome. They will soon collect upon the sponge and take up their abode in the cells. It is only necessary to dip the sponge in scalding water, which will wash them out dead by the tens of thousands. Put on more sugar, and set the trap for a new haul. This process will soon clear the house of every ant."

[A capital idea. If the originator of this thing had patented it he would have made a fortune of it. It is the "little things" that pay.—EDS.

DEATHS IN THE CONFEDERATE ARMY.—According to a Richmond paper, the number of deaths in the Confederate army reported to the Second Auditor's office, at Richmond, up to Dec. 31, 1863, is 57,805, distributed among the States as follows: Georgia, 9,504; Alabama, 8,987; North Carolina, 8,261; Texas, 6,377; Virginia, 5,943; Mississippi, 5,367; South Carolina, 4,511; Louisiana, 3,039; Arkansas, 1,948; Florida, 1,119.

THE heavy taxes on the manufacture of wines are expected to produce depressing effects on logwood, gooseberries, elderberries, and other elements of celebrated vintages. Thus industry will suffer, but probably human stomachs will gain.

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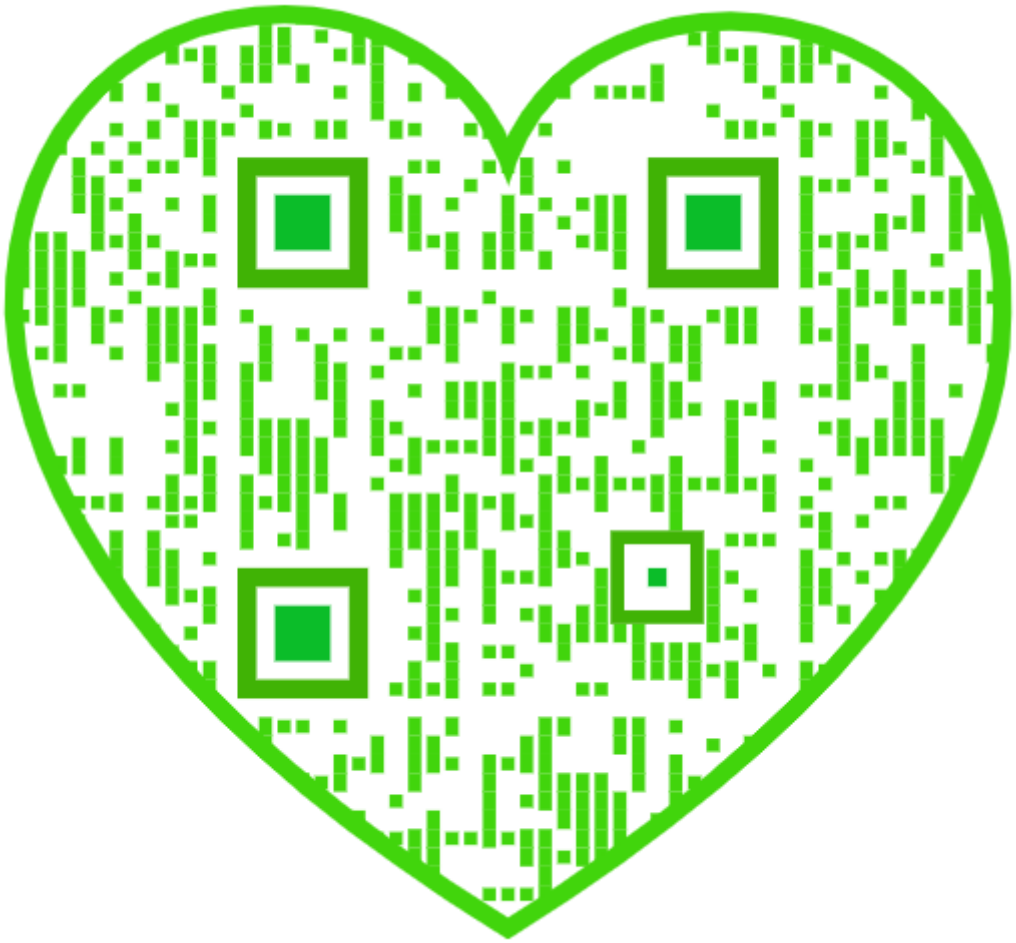

THE WAY ALUMINUM IS PROCURED.

From a long article in the *Mechanics' Magazine* (London) on the metals of the earths, we extract the portion relating to production of aluminum:—

"The distinction between the new metals and the old is due to the fact that the metals of the earths—herein differing from all the metals which have preceded them in use among mankind—cannot be reduced, directly, either from their oxides or from their sulphides, at least by any agents or processes at present known. All the metals which were known to commerce before the introduction of aluminum are readily reducible from their compounds with oxygen, and those of them which do not occur in nature in the free (or 'native') state are always obtained, in practice, either from their oxides, or (much less frequently, so far as direct reduction is concerned) from their compounds with sulphur—that other prominent member of the oxygen group of elements. The metals of the earths, on the other hand, have so powerful an affinity for oxygen that there is no known agent which can take that element away from their compounds with it, leaving the metals free, in the metallic form; and although their affinity for sulphur seems to be—especially in the two cases of aluminum and magnesium—comparatively but slight, no method of reducing them from their sulphides has hitherto been discovered. The only compounds of these metals from which it has yet proved possible to obtain the metals themselves in the free state, are their compounds with one or other of the four 'halogens'—fluorine, chlorine, bromine and iodine. The fundamental distinction, therefore, between the old metallurgy and the new, is this: as regards the final processes of reduction, the old metallurgy always operates upon either oxides or sulphides; the metallurgy always upon 'haloid' compounds—fluorides, chlorides, bromides or iodides.

"It is chiefly in combination with oxygen, and not with any of the halogens, that the metals of the earths occur in nature. Three haloid compounds of them exist in considerable abundance: chloride of magnesium forms ten per cent of the saline constituents of all sea-water; fluoride of calcium, or fluor spar, besides occurring elsewhere, is found in almost all metalliferous veins containing either silver, lead, copper, tin or cobalt ores; and fluoride of aluminum, combined with fluoride of sodium to form the mineral known as 'cryolite,' although as yet it has not been discovered anywhere else, exists in somewhat large quantity at Evigtok, in Arksutfjord, West Greenland; but the quantity in which these haloid compounds of the metal in question exist, though vast absolutely, is insignificant in comparison with that in which the oxides of the same metals occur—their oxides, together with those of silicon and carbon, with one or the other of which (in other words, with either silicic or carbonic acids) the oxides of the earth-metals are most frequently combined, forming, as we have remarked before, by far the largest proportion of the known crust of the earth. Neither of these natural haloid compounds of earth-metals is at present used as a source of its metallic base. The mutual affinity of calcium and fluorine is far too great to permit of the reduction of calcium from its chloride, by any agent as yet at our command; aluminum can be reduced pretty readily from the double fluoride of aluminum and sodium, but, in practice, the double chloride of those metals is found to be the most convenient source of it; and although it is from its chloride that magnesium is reduced, the chloride of magnesium which occurs in sea-water has not yet been used metallurgically. Hence, at present, the haloid compounds of earth-metals from which the metals themselves are actually obtained are all prepared artificially.

"Sodium is the reducing agent invariably used in the new metallurgy, the degree in which it is less energetic than potassium being barely appreciable, while it is not only very much cheaper than potassium, weight for weight, but, the proportion of its chemical equivalency to that of potassium being as 23 to 39, 23 parts by weight of it will do as much chemical work as 39 similar parts by weight of potassium. Sodium will reduce aluminum, the least basylous of the three metals under consideration, either from its fluoride, its chloride, its bromide, its iodide, [illegible] for even the most energetic of the halogens being inferior to that of sodium for the same elements.

"The chloride of aluminium is much more difficult to obtain, free from water, than are the chlorides of those metals whose affinity for chlorine is less inferior to their affinity for oxygen.

"Neither gaseous chlorine nor gaseous hydrochloric acid have any action upon alumina, and although aqueous hydrochloric acid dissolves and decomposes that oxide, the chloride thus formed cannot be rendered anhydrous. It crystallizes, from a saturated solution, with six atoms of water; but if these crystals of the hydrated chloride be heated, instead of the water being expelled, as water, and an anhydrous chloride remaining, double decomposition is induced, the chlorine of the chloride taking hydrogen from the water and flying off as hydrochloric acid, and the aluminum combining with the oxygen of the decomposed water, and being thus again resolved into alumina. The only known method by which anhydrous chloride of aluminum can be obtained is by submitting alumina to the action, simultaneously, of both chlorine and carbon. Neither chlorine nor carbon can of itself decompose alumina; but when both together act upon it at a high temperature, its oxygen combines with the carbon and flies off as carbonic oxide, and its aluminum combines with the chlorine, a perfectly anhydrous chloride—proper precautions to exclude moisture being supposed—subliming.

"It is not, however, the simple chloride of aluminum which is actually used as the source of the metal, but the double chloride of aluminum and sodium. By itself anhydrous chloride of aluminum fumes in the air, and is so exceedingly deliquescent that it cannot be exposed to the atmosphere a moment without absorbing an appreciable quantity of moisture, while a very little moisture does a great deal of harm, since, under the influence of the heat of the reducing furnace, it causes the decomposition of its equivalent of chloride and the formation of an equivalent of alumina, and since the alumina thus formed not only constitutes a direct loss of material, but also involves a much greater indirect loss, by preventing the particles of metal eliminated from those portions of the chloride which it may be in contact with from fusing together as they are set free, and so causing much of the metal to be reduced in the form of a fine powder, incapable of being subsequently fused into one mass. As the double chloride of aluminum and sodium is much less deliquescent, and is moreover quite fixed at ordinary temperatures, it thus possesses obvious advantages, as regards both economy of material and facility of manipulation.

"It is most important that the double chloride of aluminum and sodium used for the reduction of aluminium from it, should be as nearly as possible chemically pure. It should especially be free from iron and silicon, as those elements, if present, will inevitably be reduced with the aluminum, and there is no known method by which they can be separated from aluminum when once mixed with it, while almost infinitessimal quantities of either exercise a most injurious influence upon that metal, very greatly increasing its liability to tarnish, as greatly diminishing both its luster and the facility with which it can be worked, and entirely destroying its capability of forming those compounds with copper—the various kinds of aluminum bronze—in which it has found most of the applications to which it has as yet been put. Phosphorus, in however minute quantity, is scarcely less prejudicial. When now about four and a half years ago, Messrs. Bell, Brothers, commenced producing aluminum on a large scale, both they and the French aluminum metallurgists used the ammonia-alum of commerce as the source of their alumina. When the ammonia-alum is exposed to a sufficient heat, both its water, its sulphuric acid, and its ammonia are driven off, only the alumina, with any non-volatile impurities which were present in the alum remaining behind. Commercial ammonia-alum almost invariably contains both iron and silicon; and hence, the discovery, early last year, near Toulon, of a mineral, existing there in considerable quantity, from which alumina can be readily prepared quite free from those so prejudicial impurities, soon led to the entire abandonment of the use of alum as the raw material of the aluminum metallurgists. This mineral has been named Bauxite, and consists of 60 per cent of aluminum, associated with 25 per cent of red oxide of iron, 3 per cent of silica, and 12 per cent of water. Both here and in France aluminum is now produced from it exclusively.

"The Bauxite, having first been reduced to fine powder by grinding under an edge-stone, is mixed with a quantity of soda slightly more than to form aluminate of sodium with the alumina of the Bauxite, and the mixture is heated in a reverberatory furnace. Its ingredients react on each other, not only without fusion, but even without agglutination, the contents of the furnace, after the reactions have taken place, being still in the form of very fine powder. They now consist of aluminate of sodium, mixed with free oxide of iron, a very small quantity of double silicate of aluminum and sodium, and still smaller quantities of free silica and free alumina. On lixivation with water, only the aluminate of sodium is dissolved, the ferric oxide, the free silica and alumina, and the double silicate of aluminum and sodium, being all insoluble.

"The solution of pure aluminate of sodium thus obtained is decanted into a horizonal cylinder, made of sheet-iron, and fitted internally with a paddle-agitator, capable of being worked very rapidly. A current of carbonic acid gas is made to enter the cylinder at its lower part, and the brisk working of the agitator, by throwing the contained liquid into a state of fine spray, insures that the carbonic acid shall act on every part of it. This carbonic acid decomposes the aluminate of sodium, carbonate of sodium being formed and alumina set free. When this reaction is complete, the contents of the cylinder are transferred into another vessel, and allowed to remain for some time at rest. The alumina then collects at the bottom, and when it has entirely subsided, the supernatant liquid, consisting of pure solution of carbonate of sodium, is carefully decanted away from it. This solution is evaporated, and the soda in it recovered—the only loss of soda in the entire process being that of the very small quantity which enters into the double silicate of aluminum and sodium which is formed during its first stage.

"The precipitated alumina is next submitted to careful washing, which leaves it almost absolutely pure. This washing is effected by means of large filters, which fit into apertures in the upper surface of a sheet-iron vessel so arranged that steam can be passed through it, and a strong suction force be thus brought to bear on the under side of the filters, greatly facilitating the process of washing. The washing being completed, the alumina, as a most beautifully white paste, of about the consistency of mortar, is placed on the hearth of a reverbatory furnace, and submitted to heat till it is entirely freed from water. It is then intimately mixed with an equivalent each of chloride of sodium (common salt) and powdered wood-charcoal, and the mixture is moistened with water just sufficiently to admit of its being made up into balls of about the size of an orange. These balls are dried in a room through which a current of hot air is being constantly passed, and when they have thus been completely de-hydrated they are ready for the chlorine furnace.

"This furnace is so constructed that the flame from its fire-place is made by means of a spiral flue, to circulate round a large cylindrical vessel of very refractory fire-clay, which is placed vertically, and in which the balls just described are submitted to the action of chlorine. The balls are placed in this vessel through an opening at its upper end, which is afterwards closed with a cover, very carefully luted. Chlorine, obtained by the reaction of hydrochloric acid on peroxide of manganese, and first well washed, and then carefully freed from moisture by being passed either over anhydrous chloride of calcium or through concentrated sulphuric acid, enters the vessel through a tube fitted into an aperture at its lower end. When the temperature has been sufficiently raised, the alumina in the balls is decomposed by the joint action of the carbon with which it is mixed in the balls and the atmosphere of chlorine, chloride of aluminum and carbonic oxide being formed, as explained above. The chloride of aluminum, as fast as it forms, combines with the chloride of sodium contained in the balls, and the double chloride of aluminum and sodium thus produced, volatilizes, and, mixed with the other product of the

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reaction, the carbonic oxide passes out of the vessel through a tube closely fitted into an aperture at its upper end. This tube communicates with a closed earthenware receiver, in which the double chloride condenses, while the incondensible carbonic oxide passes off through a tube communicating between the receiver and the furnace-chimney.

"The double chloride of aluminum and sodium is thus obtained as a crystalline mass of an exceedingly beautiful golden color. It contains a little over 14 per cent of aluminum, to eliminate which is the object of the next and concluding operation. To this end, the double chloride is mixed, pretty intimately, with half its weight of cryolite—which mineral was once used as the ore from which aluminum was reduced, but is now used in aluminum metallurgy, solely as a flux—and this mixture, together with a quantity of sodium, in small ingots, equivalent to the aluminum in the double chloride (which is at about the rate of 23 parts of sodium to every 9 parts by weight of the aluminum contained therein), is thrown upon the hearth of a reverberatory furnace, which has previously been raised to a sufficient temperature. The moment the furnace is charged, all access of air is cut off, by means of dampers closing all avenues of communication with the external atmosphere. The reaction commences immediately, and is very energetic. The sodium seizes the chlorine of the chloride of aluminum contained in the double chloride of aluminum and sodium, combining therewith, and thereby liberating the aluminum in the metalic state, causes an evolution of heat which speedily liquifies the entire contents of the furnace, and raises the walls of the furnace itself to bright redness. The aluminum, as it is set free, sinks to the bottom of the liquid mass, and when the reaction is over, and the furnace is tapped by removing the stopper from an aperture at the back of it, the slag, consisting chiefly of chloride of sodium and fluoride of aluminum, escapes first, and then the aluminum flows out in a single jet, and collects in one mass below the liquid slag. It has now only to be re-melted and re-cast, in order to free it from any adherent slag, to be ready for market.

"Such is the process by which aluminum is now produced on the great scale."

PHOTOGRAPHIC ITEMS.

NEW HEAD-REST.

The photographic head-rests at present in use are very apt to show in the picture either their base on the floor or their rods. The principal object of this invention is to prevent such exhibition, and to render the rest invisible when used; and the improvement consists in constructing the lower portion of the rest of two flat standards and a cross-head, containing a socket, combined in a peculiar manner. It also consists in constructing the central or sliding rod of the head-rest with a ratchet, and in providing on the socket a spring pawl to operate upon the said ratchet, to retain the said rod in any position independent of the set screw. Photographers are much pleased with the invention. G. A. Emery, 192 Hanover street, Boston, Mass., inventor.

Sleeping out of Doors.

A sensible writer in *Harper's Magazine* for September, concerning this matter says:—

"I thought I should never get to sleep. I had a bed of cornstalks, but I believed I was roughing it. It was the dreadful exposure to the night air which worried me, and not the proximity of hostile balls and bayonets. And when I was aroused at five in the morning to continue the march, I actually felt more fearful of being broken down by want of proper rest than of being shot in the approaching engagement. How mistaken our mothers were when they warned us against exposure to night air, and sleeping in damp clothing, and going with wet feet! Judging from a two years' experience of almost constant field service, I aver that these things are wholesome and restorative. It does not require a strong constitution to stand them; it is sleeping inside of walls which ought properly to be called exposure and which demands a vigorous vitality; and it is the crowning triumph of civilization that it enables humanity to do this without extermination. I have a screed to deliver some day on this subject to a misguided and house-poisoned public."

A Lock without a Key-hole.

The impossibility of rendering a strong box altogether safe against theft by means of skeleton keys, has led a locksmith of Frankfort-on-the-Main to hit upon the ingenious idea of constructing a strong box without any key-hole at all, and which even the owner himself cannot open. Why, what's the use of such a box? you will ask. But observe: inside is a clock-work, the hand of which the owner places at the hour and minute when he wants access to the box. The clock-work begins to move as soon as the lid is shut, and opens the lock from the inside at the moment which the hand of the clock indicates. Time, dependent upon the owner, is the key to the lock—a key which can neither be stolen from him nor imitated.

[This plan is quite old and has been applied to safes in this country nearly ten years ago. It is rather inconvenient in some respects, for if the lock be set to open at 9 A. M. of the following day, and the proprietor changes his mind and wants some money at 2 P. M. he can't get it but must wait until the box opens itself.—Eds.

Smoke and Smokers diminishing.

The heavy tax imposed on tobacco has seriously interfered with the trade in that article. In this city the number of cigars manufactured daily, before the the tax was imposed, was over a million. Some two thousand journeymen were employed in making these, and their salaries ranged from $15 to $25 per week. Now a large number of journeymen are out of employment, and they will have probably to follow other pursuits. The most remarkable result of the tax is that it has led nearly one-half the smokers to abandon the use of cigars. It is estimated that there are five hundred thousand of the former consumers of the "weed" abstaining from it. The fact is proved by the proportionate decrease in the manufacture of cigars.

Dog and Cat Leather.

The *Shoe and Leather Reporter* says:—"Skin the dogs and cats, and put their hides to some profitable use; let the bone-boilers have their bones. In one of the wards of Newark, N. J., where some 1,300 votes are polled, there are estimated to be about 600 dogs—worthless hungry curs, with about the same number of cats, to dispute possession in and about the domicils of their masters and mistresses. We say kill and skin them. The skins of the biggest mastiffs are fit to be tanned for boots and shoes, or thick riding gloves, the skins of lesser dogs can be dressed white for gloves. And so of cats. Rid the world of some of these nuisances, and put their hides and bones to a better use than many of them would otherwise attain."

Gun-cotton and Gunpowder.

In an article on gun-cotton, in the *Quarterly Journal of Science*, Mr. Scott Russell says:—1. Is gun-cotton stronger than gunpowder? The answer to it is—Yes; six-fold stronger. By this we mean that if we take a given weight of gun-cotton, say 40 ozs., and bore a hole 1½ inch in diameter and 3 feet deep into hard rock or slate, in a quarry, and put 40 ozs. of gun-cotton in it, it will occupy about 1 foot of its length, and the aperture being closed in the usual manner, and a match-line led from the charge to the proper distance from which to fire it; and if we next take 40 ozs. of best gunpowder, bore a similar hole, and charge it similarly, with gunpowder, and close it in the same way, it has been found that, on these being exploded, the 40 ozs. of gun-cotton have produced greater effect, in separating the rock into pieces than the 40 ozs. of gunpowder. The answer is, therefore, that in disruptive explosion the strength of gun-cotton is six-fold that of good gunpowder.

Chain-armor was first used on board the *Richmond*, Capt. James Alden, at New Orleans, and the credit of suggesting it is ascribed to Chief Engineer John W. Moore, U.S.N.

Civil engineers report that the volume of water which passes over the Falls of Niagara is ninety millions of tuns per hour.

The Hecker and Waterman Experiments.—Accounts of these will be continued next week.

Amber.

This is a substance on which a great deal has been written. It has generally been classed among minerals, although avowedly originating from the vegetable kingdom. Nothing as yet has afforded a clue to the plant that may have produced it; nor has any plausible conjecture been formed from the flowers and insects sometimes imbedded in its mass. Its peculiarly resinous nature seems to point to some *Hymenea* or to the *Binu Dammara* as the parent plant, but there is no perfect identity between the produce of these genera and ambera. Nor is it certain that all kinds of amber proceed from the same source; for its aspect often varies considerably according to the beds in which it is found; which circumstance has led many naturalists to the belief that there are several amber-producing plants. In a paper addressed to the Academy of Sciences by M. Baudrimont, the composition of this anomalous subject is examined. Recluz had already shown that white and opaque amber contains more succinic acid than the perfectly transparent yellow sort; Drapiez had analyzed it, and found it to contain carbon, hydrogen, oxygen, and a small portion of ashes, consisting of lime, alumina, and silica. M. Baudrimont, however, shows that it contains another element not hitherto mentioned, sulphur. If a few fragments of amber be subjected in a test-tube to a heat of distillation, and paper impregnated with acetate of lead be immersed into the white fumes evolved, it immediately turns black, thus unmistakably denoting the presence of a sulphureted compound. The proportion of sulphur contained in amber is not, however, very considerable, since our author fixes it at somewhat less than one-half per cent. But under what form does it exist therein? Is it contained in the essential oil, or in the two soluble resins, or in the insoluble bitumen contained in the amber? M. Baudrimont does not tell us, but states that most certainly it is combined with organic matter, because it is evolved under the form of hydrosulphuric acid.

Tincture of Aloes as an Application to Wounds—M. Delioux observes that, notwithstanding the great repute of aloes as an external application in former times, it is now seldom used, and that he was induced to give it a trial in consequence of its great utility in veterinary practice. After trying it in combination with other balsamic substances, he has come to use it alone, finding a saturated tincture made with one part of aloes and two of alcohol to be the best preparation. Suppurating wounds, when at all of an atonic character, are to be dressed by means of charpie dipped in the tincture, the application causing little or no pain. Old and obstinate ulcers are much benefited by it. It is useful also to bear in mind its great cicatrizing power in wounds and ulcers occurring in our domestic animals, especially the horse. Erosures and gallings, by its aid, are prevented degenerating into ulcers.—*Bull. de Thérap.*

Thieving Expressmen.—It is almost impossible to send fruit by express and have it arrive safely. The companies assume no responsibility for fruit, and their agents take advantage of this fact and steal all the finest in the package and leave the rest for the miserable forwarder. An exchange says, concerning this practice:—"The pilfering of fruit by express agents is discouraging the business. The more rare and costly the fruit, the more certainty of robbery. I have seen them get more than they could eat. I could enjoy something from seeing my hogs eat strawberries and fine pears; there would be a profit in it. One would do well to invent and patent a method which would prevent this robbery. It has become customary to put newspapers around boxes of raisins, but these pirates can get paste. Express companies should look to this. Does any body know where United States mail robbers get the rudiments of their education?

Professor Dalton, in his standard work on physiology, states that common salt—the chloride of sodium—is found in the bones, muscles, tendons, nerves, hair, and nails, in the salvia, gastric juice, and blood, in all the fluids and in all the solids of the human system, with the single exception of the enamel of the teeth, where it has not yet been detected.

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The Thickest Iron Plates Smashed.

On page 103 of our current volume we republished from the London *Mechanics' Magazine* an account of the most interesting experiment yet made in all of the series at Shoeburyness, the discharge of a 600-pound projectile with 40 pounds of powder against the strongest iron-plated target that has ever been constructed; the result being a complete smashing of the target. The London *Times* gives some further particulars of the gun, the target, and the experiment, as follows:—

"This excellent specimen of forging was made by the Elswick Ordnance Company. Its caliber is 13½ inches, its greatest external diameter 4 feet 5½ inches, its total length 15 feet 3⅓ inches, and its weight upwards of 22 tuns. This was, when it was delivered, not only the largest gun made on Sir William Armstrong's coil system, but was also by far the largest rifled gun is existence. There are many 600-pounders on other systems made now, and all for the use of foreign governments. The best idea of its tremendous powers of destruction may be formed from a description of its projectiles; these are of the usual kind adopted by Sir William, namely, a common shell, a segment shell, and a solid shot. The common shell is 2½ feet long, and carries 47 pounds of powder. The segment shell carries upwards of 500 segment pieces, weighing nearly half a pound each, which are dispersed on bursting by a charge of 15 pounds of powder, ignited either in flight or on striking an object by the action of the time or percussion fuse. The ordinary solid shot is of cast-iron; but the most formidable projectile against plates is the steel shell, which carries a bursting charge of 24 pounds. Steel shells containing molten iron can also be used against plated ships.

"Among others a most important experiment was tried last week at Shoebury with the Armstrong 600-pounder shunt, to ascertain what its effect would be at 4,000 yards range. Of course it was not possible to ascertain this on a range actually of that length, as the Government have none on land greater than 800 yards, and it would be impossible to erect a target in the sands so far out at sea. The experiment was, nevertheless, just as conclusively made by a calculation of initial velocities. The initial velocity or speed at which the 600-pounder moves has been taken by Narvaez's electric apparatus at ranges from 200 up to 1,500 yards, and with these two numbers it was easy to find the third, namely, what its speed would be at 4,000 yards, which was found to be at the rate of 860 feet per second. The next thing to be ascertained was the charge of powder which would drive it from the gun at this velocity; and this being found to be 40 pounds it was at once easy to make experiments at 200 yards, which would give precisely the same results as to destructive effects that would be got at 4,000. The gun, therefore, was loaded with a 40-pound charge and a steel shot weighing 303 pounds. This was fired against a very celebrated target at Shoebury, called the 'box target,' and one of the strongest, if not the very strongest, ever constructed. It is faced outside with one of John Brown & Co.'s admirable 6½-inch armor plates. Behind this, strengthened with horizontal springers of wrought iron, are 18 inches of teak, and behind this, again, a double skin of iron, 1⅓-inch thickness, the whole being backed by iron ribs 22 inches by 10 inches. As the resistance of armor plates increase as the square of the additional thickness, this target is literally more than twice as strong as the *Warrior* broadside. The 600-pounder, as we have said, was fired against this with a 40-pound charge. The shot left the gun at a speed of 860 feet per second, and struck at a velocity of 840, crashing through both plate and backing. The point of impact was, unfortunately for the shot, just where the target was strongest, from the support of nearly 3 feet of solid pine beams, which form the box sides. Yet armor plate and backing were both crashed through, a perfect shower of pieces of the armor and splinters, or little beams, rather, being cast far and wide in all directions. Nothing could be more conclusive than this proof that, according to both theory and practice, the Armstrong 600-pounder is capable of smashing through the strongest sea-going armor-clad that could be got to float at a distance of 4,000 yards or more. There is no reason to doubt that the same result would have been effected if the shot had been fired at 500, or even 600 hundred yards, instead of 200—an increase of range which, according to the calculated scale we have described, would have represented an actual distance of all but three miles. The experiment, therefore, was satisfactory in this result, and still more satisfactory in another, the War-office having now determined to try the 600-pounder regularly with its full charges of powder and shot up to 14° of elevation, which is the highest that can be got with its present carriage. The gun has, therefore, with the greatest difficulty (for everything connected with the transport of heavy ordnance is of the roughest and most primitive kind at Shoebury), been placed on the bank overlooking the sea, and the experiments will be continued with it, till we shall at last know something of the piece, good or bad. It has been nearly two years at Shoebury, but incredible as it may seem, it has never been tested properly yet."

DICKSON'S ADJUSTABLE ISSUE WHEEL.

This water-wheel is intended to be self-regulating as regards its speed and power. When the speed of the wheel becomes too great the water is not allowed to exert much force, but when more power is required the full head of the fall is directed upon the buckets. The details are as follows:—

The wheel, A, has buckets, B, of the most approved

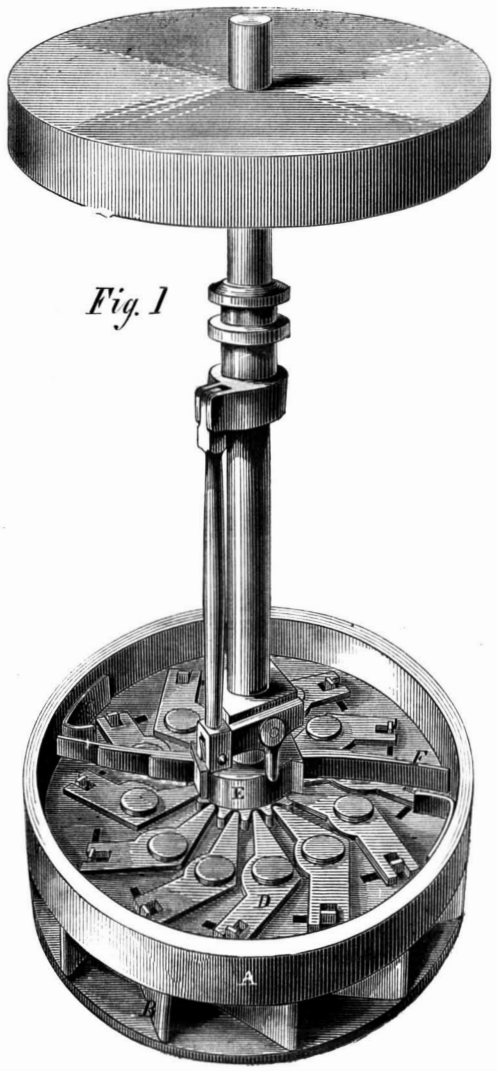
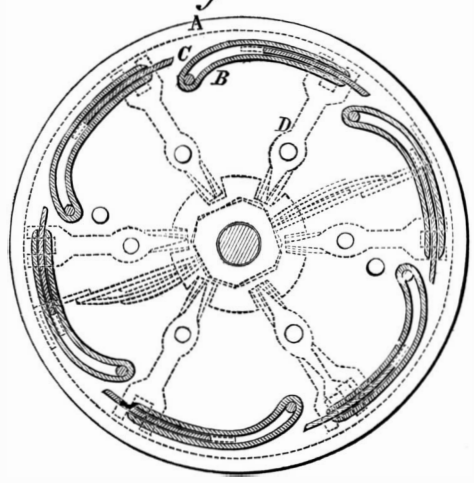


Fig. 1

form. Inside of these buckets there are sliding gates, C, Fig. 2, which are also buckets in one sense, that connect with the levers, D, on top. The ends of these levers all play in a slotted wheel or gear, E, on the main shaft, which is not keyed to the wheel itself. The opposite ends of the levers connect with the sliding gates before mentioned, so that when the wheel meets with great resistance it twists slightly on the shaft which causes the levers to open the gates so that the water can escape freely. In this way the wheel constantly regulates itself for the amount of work to be done. The elliptic spring, F, does not yield when the wheel is running at a low speed, but when the power is to be increased it gives, and allows the levers to act as before stated. In regard to this wheel the inventor says:—

"The movement simply weighs the resistance and then adjusts the issues to correspond with it, and does so instantly or gradually, as the resistance may vary. Any millwright will readily see the importance of saving the water in the pond when the wheel is doing light work. In a saw-mill, if the sawyer is half the time backing-up and setting, while using a

Fig. 2



circular saw, this arrangement will effect a saving of nearly half the water and likewise give a uniform motion. It is useful to propel any kind of machinery, but more especially factories, paper-mills, and machine-shops, or where the resistance varies materially. The cap which covers the entire wheel is removed in the drawing to show the interior."

This wheel was patented on May 27th, 1862, through the Scientific American Patent Agency, by Perry Dickson, of Erie, Pa.; for further information address Snyder & Walter, 229 Broadway, New York.

California Ants.

That enemy of the hoarded sweets of the California housekeeper, the ant, is beyond counting in his annoyances this year. In the warmer districts of the State nothing eatable can be stored without attracting myriads of them, and the destruction they cause is really an important item. They have never within memory of the oldest settlers been so numerous in the lower levels of the Sacramento and San Joaquin as in 1864, and in the mines, residents inform us they invade in armies every pantry, kitchen and closet. If a piece of meat, cheese, sugar, bread or what not is laid down, in half an hour it will be completely covered over with these devouring little wretches and burrowed, tunneled and perforated with marvelous expedition. The miners say they are laying up an early stock of comestibles to pass a long and heavy winter! In the vineyards and gardens as the fruit ripens, the ants spoil what the rascally birds and squirrels leave, and figs and soft fruits are their special delight. The ripening grapes around Los Angeles are a great attraction to them, and the vineyard men run in distraction over their raids, and it is likely they will spoil the making of much good wine and brandy, as each of their wretched little bodies contains a concentrated quantity of a peculiar acid, sour as vinegar. Here indeed is a new and strange plague, and there is not only the common little go-to-the-ant-thou-sluggard species in California, but several others, some with wings and some without. One of these, twice as big as a flea, bites like a fish-hook, while another of his fellows, of blood color, stings as he bites, rousing up the babies and kittens to a terrible concert of squalls and tears in the quiet hours of the night.

Large Artesian Wells.

Mr. W. Mather, of the Salford Iron Works, Manchester, England, recently read a paper before the South Wales Institute of Engineers upon machines for boring artesian wells. In the course of his remarks he said that his machine averaged three feet per day, including stoppages, and that he had already sunk wells of 18 inches diameter and 1,184 feet depth. Machines were already in use capable of boring 2 feet diameter, and he had some in progress capable of making 3 feet bores. He would make a machine capable of boring 6 feet in diameter to any depth, if necessary. Steam power is used to operate the borer. It would work through rock readily, and the Weardale Iron Company were using it to test the character of the strata through which the well was sunk for coal.

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BONES.

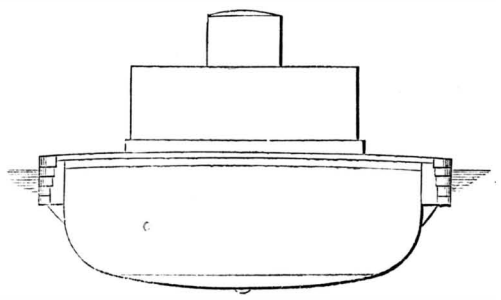
[Concluded from page 116.]

BONE-BLACK OR CHAR.

In 1800, Löwitz made the interesting observation that wood charcoal possesses the remarkable property of removing coloring matters from their solutions. In 1811, Figuier also observed that animal black has far greater decolorating power than wood charcoal, and bone-black has consequently become one of the principal agents in sugar-refining, and has been the means, more than any other substance, of producing good and cheap white sugars. To give you an idea of the extent to which bone-black is used at the present day for decolorating purposes in the refining of sugar, I may state that in Paris alone it is estimated that about 11 million kilogrammes of bones are used annually for that purpose. The preparation of bone-black is simple in principle. It consists in placing in cast-iron pots about 50 lbs. of broken boiled bones, that is, bones which have been deprived of their fat—of most of their osseine; and piling these pots in a furnace, where they are submitted to a gradually rising temperature, during twenty-four hours, such as will completely decompose the organic matter, but not so high as to partly fuse the bones and thus render them unfit for their applications. But a more economical process is generally adopted. It consists in introducing the crushed bones into horizontal retorts, which are themselves in connection with condensers, the ends of which are brought under the retorts to assist by their combustion in the distillation of the animal matter. By this arrangement not only is char obtained, but oily matters which are used by curriers, and also ammoniacal salts employed in agriculture and manufactures. The extraordinary decolorating action of animal blacks may be considered as partly chemical and partly mechanical—mechanical because it is proved by some interesting researches of Dr. Stenhouse, to which I shall refer further on, that the action is due to the minute division of the carbon and the immense surface offered by its particles to the coloring matter, char being composed of 94 parts of mineral salts to 10 per cent of carbon. On the other hand, the action is proved also to be chemical by the fact that water will not remove the coloring matter, while a weak solution of alkali will dissolve it. Dr. Stenhouse's valuable researches not only illustrate fully this fact, but also prove the possibility of producing artificially substitutes for bone-black. In 1857 he published a paper describing the production of an artificial black, called by him aluminized charcoal. This he obtains by mixing intimately, and heating finely-pulverized charcoal and sulphate of alumina, when he obtained a powerful decolorating agent containing 7 per cent of alumina, and well adapted for decolorating acid solutions, such as those of tartaric and citric acids, in chemical works. He also prepared what he called coal-tar charcoal, by melting one pound of pitch in a cast-iron pot, adding to it two pounds of coal tar, and mixing intimately with it seven pounds of hydrate of lime, then carrying the whole to a high temperature, allowing it to cool, removing the lime by washing the mass with hydrochloric acid, and then with water, when carbon in a high state of division was obtained possessing powerful decolorating properties. The following series of experiments by Dr. Stenhouse perfectly illustrate the chemicophysical action of animal black by a decolorating agent. He boiled a certain amount of char, and his two charcoals, with a solution of logwood, then treated each black separately with ammonia, when the following results were obtained:—Aluminized charcoal yielded no color. Bone-black but a slight amount. Coal-tar charcoal, large quantities. But it would be wrong in me to leave you under the impression than animal black can only remove colors from solutions. Purified animal black, that is to say, animal black deprived of its mineral matters by the action of muriatic acid and subsequent washing, has the power of removing certain bitters from their solutions. Thus Dr. Hofmann and Professor Redwood applied this property with great skill, some years ago, to the detection of strychnine in beer. Again Mr. T. Graham, Master of the Mint, published a most interesting series of researches, in which he established the fact that purified animal black had the power to remove a great number of saline matters from their solutions, such as the salts of lime, lead, copper, &c."

THE MONITOR "TECUMSEH."

When the accounts were received from rebel sources of Farragut's brilliant victory in Mobile Bay, it was stated that the monitor *Tecumseh* was sunk by the guns of Fort Morgan. We immediately wrote an article expressing our disbelief in the statement, and asserting our opinion that no guns in the rebel service could sink one of these vessels. Before the article was set up our own accounts came to hand, when it appeared that the *Tecumseh* was sunk by a torpedo, an instrument that will sink any vessel in the world if exploded in contact with her bottom. The *Tecumseh* was one of the harbor and river monitors of which nine were built all precisely alike; the *Tecumseh, Canonicus, Manhattan, Catawba, Oneoto, Manayunk, Mahopac, Saugus and Tippecanoe.* The annexed cut represents a midship cross-section of one of these vessels. Their principal dimensions are as follows:—



Length of deck, 224 feet; width on deck, 43 feet; depth on deck, 13 feet 6 inches; length of iron hull, 37 feet 6 inches; projection of armor shelf forward, 9 feet 6 inches; projection of armor shelf aft, 24 feet 6 inches.

The hull is of half-inch plates, garboard strake five-eighths of an inch. Frames four by four-inch, 18 inches apart, and on every alternate one a 16-inch cross floor of half-inch iron, topped with two bars of $3\frac{1}{2}$-inch by $3\frac{1}{2}$-inch angle iron. Deck timbers 12 inches square, and three feet from center to center, deck of 7-inch plank. The side armor is of five thicknesses of inch-plates, in addition to which the vessels of this class have two massive bars of iron called "armor stringers," running entirely around the ship, under the armor, and serving to support it near the water-line. These stringers are six and a half inches wide by six inches thick, for about 70 feet at the bow, and for the remaining distance they are six and a half inches wide by four inches thick, thus making the armor in the part most liable to be hit nine inches in thickness. The deck armor is of two plates, the upper one 1 inch and the lower one half an inch. To provide against such an accident as happened to the *Monitor*, there is introduced in the angle formed by the sides and the armor shelf a plate iron sponson, the space behind which is filled in with pine wood; the thickness of armor and wood backing is 2 feet 8 inches.

The turret is made of ten thicknesses of inch plates is nine feet high and two feet inside diameter. To avoid being disabled as the *Passaic* was, in the first attack on Charleston, the base of the turret is strengthened by a band of iron 15 inches wide and 5 inches thick, having its outer edges well rounded so as not to be "upset" by any chance shot.

An Experiment with Gun-cotton.

A correspondent of the London *Engineer* says:—

"In connection with the society's meeting we may note, that, taking advantage of the Royal Agricultural Society, Messrs. Prentice, of Stowmarket, Suffolk, submitted their improved gun-cotton to a military engineering trial on Saturday. Mr. Prentice was present and Herr Revy conducted the experiment, to witness which a large company of scientific gentlemen and others assembled. The work to be operated against was constructed in the form of an ordinary stockade, similar to what is commonly used in fortifications. It was compose l of a double row of timber; the first consisting of six balks, each 10 feet long by 12 inches or 14 inches square; the timber backing formed of five balks 9 inches to 10 inches square. These balks were sunk about 4 feet into the ground, and firmly bedded. Two heavy logs, 7 feet long by 14 inches square, were laid in front of the stockade to form a bridge on which to place a shell containing the gun-cotton. The timber was the best Memel, and was supplied by Messrs Burnup, Barres Bridge. The shell was made at the Elswick Ordnance Works and was made of $\frac{1}{8}$-inch iron. It was 16 inches by 12 inches in diameter, and in its general outline was similar in form to one of Sir William Armstrong's destructive shells. This cylinder contained 25 lbs. of gun-cotton. To preclude the possibility of any accident occuring, no one was allowed to approach the stockade nearer than 300 yards; but one or two unobserved stationed themselves on the unfinished railway bridge near, and got a good shaking for their temerity when the shell exploded. The cylinder was placed upon the bridge, and all being ready the spectators waited anxiously for the impending explosion. The charge was ignited by the electric spark from a distance of 220 yards. The electric messenger was dispatched, a loud explosion, and a puff of thin steam-like smoke showed that it had accomplished its mission, and simultaneously huge fragments of wood and earth were seen flying in all directions. The spectators hurried to the spot and were surprised by the utter ruin to which the irresistable gun-cotton had reduced the strongly-built stockade. The two center timbers with their backing had been blown clean away level with the ground, one large fragment having been hurled a distance of 130 yards; the other had been torn up into splinters. The posts left standing were forced outward to an angle of 75°; and a wide gaping breech was left in the center through which an assailant could have easily entered."

Salmon climbing a Ladder.

In the fishery department of the Irish Industrial Exhibition the Special Commissioners of Irish fisheries have just completed all the details connected with the models designed to illustrate the habits of the salmon and the most approved methods of conservation. One of the most attractive features of this display is what is called "the fish ladder." This consists in a series of steps placed in a sloping position down the face of a waterfall or weir, for the purpose of enabling the salmon to ascend the river during the spawning season. The plan has been applied with great success to the falls of Ballysodare, in the county of Sligo, which previously presented an insuperable obstacle to the ascent of the fish to the upper waters. The Commissioners exhibit specimens of every variety used in the salmon fishery, and they likewise show an exceedingly curious kind of net used by the fishermen of Loughneagh for the capture of pollen, or fresh-water herring. This net is seventy yards in length, it is made of the finest flaxen thread, and its cost is but small. The collection, which is on the whole very interesting, has been well arranged under the supervision of Mr. Thomas F. Brady, the Secretary of the Commissioners.

Farina's Cologne.

This celebrated perfume is much prized for its delicacy and permanency, and many attempts to imitate it have been made, with very little success. It is asserted that one of the Farina family has published the appended recipe. It is copied from the *Zeitschrift des Norddeutschen Apotheker Vereins:*—

R. Benzoin (purified) 2 ounces
Ol. Lavandulæ 2 "
Ol. Rosmarini 4 "
} by weight.

Alcoholis fortioris, 9 gallons. To this solution are added successively:—

Ol. Neroli,
Ol. Neroli petits grain,
Ol. Limonis, of each 10 2-5 ounces,
Ol. Aurantii Dulcis,
Ol. Limettæ,
Ol. Bergamii, of each 20 4-5 ounces,
Tinct. Flor. geranii rosei q. s. Macerate for some weeks, then fill into flasks.

RATTLESNAKE LEATHER.—The editor of the Hartford (Conn.) *Press* has been shown a new kind of leather, made from rattlesnake's skins, sent from California. The skins have been tanned and are to be made up into slippers. In color they are brown, marked with black. Rubbed one way they are smooth as silk, but rubbed backwards they are very rough, the scales turning up as though the leather had been nicked with a knife. The skins measure about six feet in length. They are very delicate and easily torn, and are only valuable on account of their novelty.

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Correspondence

Mechanical Effect.

MESSRS. EDITORS:—Is the space through which a body is raised always a true criterion of "work done," or of "mechanical effect?" By referring to the text books on mechanics there appears to be no want of unanimity on the subject. Can there possibly be any mistake on a matter so vitally important? Perhaps not, but there does seem to be some knotty questions involved in relation to this subject, and our best mechanical authorities are evidently at direct variance in reference to momentum and *vis-viva*, and hence, also, in reference to the amount of force that is expended in putting a body in motion, or in bringing a moving body to rest. It is an acknowledged weakness for us to shut our eyes while looking at these marked discrepancies of opinion and say that they are mere verbal differences.

Let the question be clearly decided beyond a doubt, can be the only reasonable wish of seekers after truth. I do not wish to discuss the question here, but would like to present the following imaginary case for the consideration of your inquisitive readers:—Suppose we have a steam cylinder in a vertical position, fitted with a perfectly tight piston, yet moving without friction. Let us also imagine a perfect vacuum above the piston, and a sufficient pressure of steam below it to set the piston (from a state of rest) in motion in an upward direction with a constantly accelerated velocity acquired by falling bodies. Thus, omitting fractions, during the first second let the piston be raised through 16 feet, and have acquired a terminal velocity of 32 feet per second, and during the first two seconds let it be raised through 64 feet and have acquired a terminal velocity of 64 feet per second.

In this imaginary case we have no resistance to overcome except the resistance of the force of gravity or the weight of the piston. We observe that in the two seconds the piston or weight has been raised through four times the space that it was raised in the first of these two seconds. Then, according to the received criterion of "work done," there was four times as much "work done" in the two seconds, as had been done in the first of these two seconds. In a question of this kind the query naturally arises—would the steam pressure on the piston at the end of the two seconds be the same as it was throughout the stroke? If it did remain uniform, the steam used would of course vary as the length of the stroke; or we would have four times as much steam used in the two seconds as in the first of these two seconds. For simplicity we make no allowance for expansion or condensation. Would the steam pressure have to remain uniform throughout the stroke? is the point on which the question is nicely balanced.

It is not in my power to make or cite any experiment to tip the balance either way. If any one can I should be pleased to hear the result. However, to my reasoning, it seems perfectly clear that the steam pressure would not have to remain uniform, but would be constantly decreased in an inverse ratio to the spaces passed over during each second. The reasoning is this, the resistance is caused by gravity alone, a constant and uniform force—constant and uniform as to the *time*—not as to the space moved through, hence the expenditure of force or steam power will vary as to the time this resistance is in action, being simply twice as much for two seconds as for the first of these two.

I do not think this view of the case agrees with the best of authorities on such subjects, yet that does not prove it to be erroneous. The wisest of men are continually correcting their own mistakes.

If my view of the case in reference to the steam pressure is correct, we then have, according to the usually-received criterion of "work done," four times as much work done in two seconds as there is in the first of these two, by simply doubling the quantity of steam used. Now, making no allowance for expansion, this is evidently absurd. Hence the conclusion forces itself upon me, that the usual criterion of "work done" being the hight through which a weight is raised, is erroneous, and that in the case before us in the two seconds, there is only twice as much work done, as well as only a double quantity of steam expended as in the first of these two.

It is impossible to separate the element time from any approximately correct idea of force. God, by his immutable laws, daily gives us this element with great exactness, and we uniformly refer to it for the accuracy of all our standards for weights and measures. Then, in investigating the above question, do not let this element be forgotten. G.

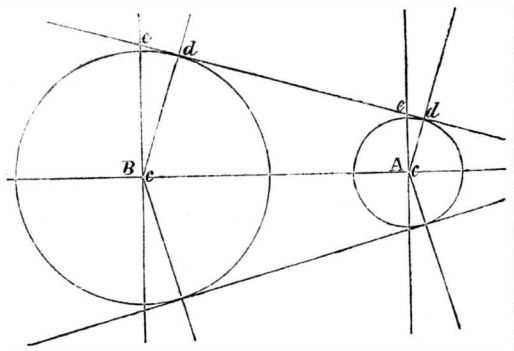
[We publish the communications of our correspondent "G." with great satisfaction, for he is a thinking man, and his articles always suggest thought. In this case his whole difficulty results from overlooking the fact that force is required to overcome inertia. When a body falls in vacuum, this is the only resistance which the power of gravity has to overcome. If steam is employed to impart the same motion to a body vertically upward, it must overcome not only the resistance of inertia, but that of gravity also. The power required to overcome gravity will be directly as the hight, while that required to overcome inertia will be as the square of the velocity.

The measure of work is entirely independent of time. A foot-pound of work is the raising of one pound of matter one foot high, whether it is done in one second or in ten thousand years. But in measuring horse-power, time is an essential element. One-horse power is the power required to raise 33,000 lbs. of matter one foot high in one minute of time.—EDS.

Sizes for Cone Pulleys.

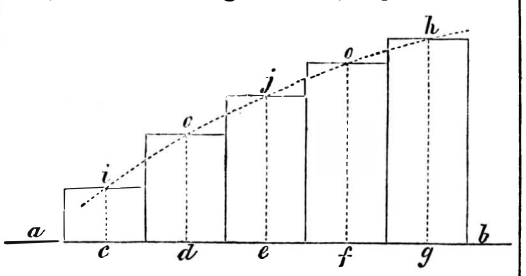
MESSRS. EDITORS:—On page 85 current volume, SCIENTIFIC AMERICAN, I noticed an article on cone pulleys which induces me to give you an aproximating rule which we have made use of several years for finding the length of belts and cone sizes.

The greatest difficulty in the matter is to find the length of that portion of the belt that embraces the pulleys where they are of unequal size. Our rule for doing this is to subtract the diameter of the small pulley, A, in the accompanying diagrams,



from that of the greater, B, and multiply the difference by the semi-diameter, *c d*, of each pulley separately, then divide each product by the distance, *c' c*, between the centers, the two quotients are the distance (*d e*) the belt varies from embracing the exact semi-circumference of the pulleys. This distance must be added to half the circumference in the case of the large pulley, and subtracted from that in the case of the small pulley, the sum of these two last results is the amount of belting in contact with the pulleys. Divide the sum by 3·14+ and the quotient is the diameter of equal pulleys to require the same length of belt, agreeable with your Providence correspondent.

Now if we would make a cone pulley with five sizes, the extremes being 16″ and 4″, we proceed thus:



let *a b* be the axes of the pulleys, and *c d e f g* the central position of each of the sizes, make *g h* 8 inches and *c i* 2 inches.

We have proved by the above rule the central size to be *e j*; with dividers we now sweep a curve so as to meet the three points *i j h*; this course gives us the diameter of the other sizes with all needful accuracy, as seen in the lines *f o* and *d o*.

F. G. WOODWARD.

Worcester, Mass., Aug. 9th, 1864.

[We thank Mr. Woodward for his information, as well as all other mechanics who take the trouble to write upon these and similar questions. We are always glad to receive letters of this kind and shall take pleasure in giving them a good position.—EDS.

The Stone Age.

MESSRS. EDITORS:—Allusion is made in Scripture to the "Stone Age" in several places; as this branch of archæological investigation attracts much attention, it may be well to state that the Hebrew rite was practiced with a flat knife (for evidence of which see Exodus iv. 25); and again the sharp knives commanded to Joshua in the Bible is more exactly rendered in the margin "knives of flint"—verses 2 and 3. A more obscure reference, but sufficiently intelligible may be noticed, in the promises of blessings by the growth of the church, in Isaiah lx. 17:—"and for stones, iron."

These remarks are induced by a paragraph in the SCIENTIFIC AMERICAN, on page 368, Vol. X., wherein it is stated that a passage in Joshua xxiv. 30, relates to the burial of certain flint implements. On reference to that chapter it will be seen that "they buried Joshua in the border of his inheritance," but there is no mention of their having "placed with him in his tomb the flint knives," &c.

Can this discrepancy be explained? All true lovers of archæology would be gratified to find so early and so sure a foundation as that of the sacred record for the existence of a custom—that of the deposit in the graves of distinguished men, certain articles of use, favor or necessity, a custom that we know was usual in very remote ages and in all conditions of civilization, from the most savage to the most civilized. FRANKLIN PEALE.

1,131 Girard street, Philadelphia, July, 1864.

[The citation of the Rev. Mr. Smith (republished in our Vol. X., page 368, from the *Geologist*), is from the Septuagint.—EDS.

Repairing Mirrors.

MESSRS. EDITORS:—The two statements which appeared lately in your paper, on the subject of repairing looking-glasses, are not correct. The repaired patch will always have a white boundary line. I have seen a damaged plate, just silvered, repaired by placing a piece of freshly amalgamated tinfoil on the injured part, and subjecting the whole to pressure; but we cannot repair an old mirror by the same means, because the conditions are changed. When a manufacturer of mirrors takes a plate from a silvering stone or "table," he places it against a wall in a diagonal position and the mercury drains to one corner. It has, as we style it, two tops (two top edges). The mercury is found mostly on the lower two edges. Were the mirror reversed in position, the superfluous mercury would run down between the silvering and the glass, forming white streaks, to the destruction of the silvering. These facts are known to all dealers. The great affinity of mercury for tin prevents its use in repairing old mirrors. The mercury employed to repair would form white streaks in the manner described on the old silvering. The practice, therefore, in the end would prove very good for the trade, but very bad for the mirror. Still, I think old mirrors, free from rust, might be repaired. I propose the following mode:—Remove the silvering from the injured part, clean the glass, form a wall of beeswax around the spot, pour on it nitrate of silver, and precipitate the silver by grape sugar, etc., etc., as is well understood. THOS. TAYLOR.

Washington, D. C., Aug. 1st, 1864.

Credit to Whom Credit is Due.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN for Aug. 6th, No. 6, Vol. XI. (new series), is an extract from Prof. Tyndall's lecture on the subject of magnetism, in which he says:—"The disturbance of molecular forces by magnetism was discovered by Mr. Joule." Without attributing to the lecturer any unfairness or partiality for his own countryman, we thought the authorship of this discovery was too well known at this time to justify any such historical blunder as this. The discovery was made and pub-

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lished by Prof. Charles G. Page, now of the United States Patent Office, in 1837, and was made the subject of several communications to *Silliman's Journal*, Vols. XXXII., XXXIII., and XLVIII. Mr. Joule published his first notice of this interesting phenomenon in the *Annals of Electricity*, for March, 1842. Furthermore, the automatic contact breaker, employed by Prof. Tyndall to illustrate the experiment, was also the invention of Prof. Page, and described by him in *Silliman's Journal*.

VERITAS.

Flying Impossible.

MESSRS. EDITORS:—As the subject of flying machines, and the possibility of men being able to fly like birds is still revived and canvassed occasionally, I propose to present for the benefit of such as still have any lingering faith in its accomplishment, the fundamental figures or basis which they must work from, so that they may see the fallacy of all such attempts and turn their ideas into a more profitable channel. In all machines of this character the air, a light and mobile fluid, must of course be used as the fulcrum, and the immense loss of power arising from the use of so yielding a fulcrum must surely be fatal to all attempts in this direction.

Wind moving at the rate of 45 miles per hour—66 feet per second—exerts a perpendicular force of 10 lbs. on one foot area. I will take this as data to figure from; and for illustration will suppose that a man of 150 lbs. weight proposes to fly with a machine which will weigh as much more, in all making the weight to be raised 300 lbs. And further, suppose that the superficial area of his propellers or wings to be 30 feet. Now it is plain that the propeller would have to have a propelling stroke or thrust of 66 feet per second—3,960 feet per minute—to get a pressure of 10 lbs. to each square foot, of the 30 feet propelling area, for a fulcrum to sustain the 300 lbs. weight. The 3,960 feet of thrust per minute multiplied by 300 lbs. gives 1,188,000 foot-pounds, which, reduced to horse-power, gives 36-horse power as the power required to sustain 300 lbs. in the atmosphere, to say nothing of the loss of power in transmitting it through the machinery; which, with the friction of the air on propellers of such rapid stroke, would be not less than one-fourth of the whole power, bringing the required power up to that of 48 horses, and still there would be no surplus power for rapid or fantastic evolutions. If the propelling area was more than 30 feet the waste of power would not be so great, and the supposed area is rather small for a fair showing of the subject, perhaps, but increased dimensions would necessarily involve increased weight of apparatus.

The attainment of success in such attempts are at present beyond the reach of man, and it is also beyond the range of probability to suppose that future improvements will ever develop and perfect matters so that a 50-horse engine and appurtenances for flying may be reduced in weight to 150 lbs. It is only a year or two since some of the New York press had a man flying around in the air, down at Perth Amboy, or in that locality, and pronounced the thing a complete success—giving the particulars of his flight, stating the enthusiasm of the crowd, etc.; this is only one of the latest attempts for its successful accomplishment. In both the Old and New World much time and money, in the aggregate, has been thrown away in these attempts to accomplish an impossibility, and fresh evidence that the subject is not dead yet has suggested this letter.

PNEUMATICS.

New York, Aug. 15th, 1864.

[According to the above calculation a sand-hill crane that weighs 40 pounds must, in order to make its high flights, have more muscular strength than 4 horses! and 1 horse is certainly stronger than 30 sand-hill cranes. Why should the speed of the fans be limited to 66 feet per second? It is not unusual to run 60-inch fan blowers 3,000 revolutions per minute, which would make the velocity at the periphery 750 feet per second, and as the resistance of the air is in proportion to the square of the velocity, this would give a pressure of 1,268 pounds per square foot, instead of 10 pounds. The subject, however, is of exhaustless interest, and let every one make public every idea which he has in relation to it.—EDS.

Odd Jobs.

A correspondent of the *Genesee Farmer* gives some useful suggestions and advice in the appended article; it will apply to mechanics as well as farmers:—

"Let any farmer or person of moderate means look round his house and make a careful minute of all the odd jobs he will find which require to be done. Let him take paper or a memorandum book and note them down. He will find at least twenty little matters requiring repair or amendment. The plank-way to the well or yard; the fence round the garden; a garden gate that will open easily and close itself; repairs to the box protecting the well or cistern; mending tools, harness—and in short almost innumerable small matters all wanting to be done, either on wet days or at some leisure time. Every one who is not a natural sloven is fully aware of the necessity of attending to these matters, but the great difficulty is he has no tools. His experience goes to show that the last time he tried to do anything of the kind he had to go to a neighbor and borrow some tools to work with. The saw was too close, and very much otherwise than sharp; the chisels were all too large or too small; the bit-stock had lost its spring and would not hold the bits in their place, so that he could not withdraw them, and perhaps broke some and had to buy new ones to replace them. Nothing was fit to use, and hence what he did was wretchedly done.

"There being no proper awl or gimlet, he tried to drive nails without the holes being bored; splits followed just when the most of the work was done, and the look of the job was spoiled, and our poor man of odd jobs was heartily discouraged, and excused himself by determining in his own mind that he never was intended for a mechanic, and never having learned the trade could do nothing at it but make a botch, which was almost worse than leaving the job undone.

"His underrating his ability was a mistake. Almost every man has a certain amount of mechanical ability, but the great drawback is bad tools! No good workman has bad tools. All the tools of a good workman are clean, free from rust, with good handles, and sharp as a razor. The saw is well set, for green or dry wood, or he has one for each kind of work—ripping, cross-cutting or fine work. How then is it possible for an inexperienced person to do work with bad tools or tools in bad order, when a mechanic, with all his experience, requires tools the best that can be had?

"The first step which any farmer can make towards renovating or repairing his homestead is to get a set of tools—some of each kind for working in iron or wood, not forgetting a soldering-iron for mending kitchen and other tin matters, and small patching. The whole can be got for forty dollars, and will save their value and cost in one year, besides the satisfaction of feeling independent and of helping yourself, instead of living in a mess or having interminable bills to pay.

"When the tools are got, a convenient, comfortable work-shop must be provided, isolated from the farm building and house as there is always more or less danger from fire. Put up a good solid bench with an iron vice at one end and a wooden one at the other, a block for an anvil, or some substitute for one, and a good grind-stone in one corner, with a foot crank to turn it with; and then the first wet or stormy day, referring to your memorandum book for the list of jobs that require to be done, select the first that your wife and family require as necessary to lighten their heavy cares and continuous work, and all experience goes to show that the outlay for tools will not be regretted."

Grindstones on the Farm.

Some good practical information is contained in the following article:—

"There is no implement so essential to farming operations, and no one to which so little attention is paid as a grindstone. Formerly they were made with mallet and chisel, of all shapes, except perfectly round; with a square hole, rarely, if ever placed in the center, and of every imaginable grit, from the fineness of marble to the coarseness of puddling stone, and varying in hardness from that of salmon brick to a Quincy granite. In those days it was quite an event in a farmer's life to "hang the grindstone," and required all the mechanical ingenuity of the neighborhood to do it properly, but now, any boy can hang a grindstone in five minutes without the possibility of cranking it, and with the certainty that it will run true without dressing off.

"The best grindstones are now made by machinery, which renders them mathematically true, and the grit being selected only of the best quality, the getting of a good one is reduced almost to certainty. The ordinary square cranks have been superseded by those made on the self-adjusting principle, which consists of a round shaft (on which a screw is cut) and two plates which are screwed together with a burr so as to suit any thickness of stone, which by pressing against the sides of the stone (instead of being wedged into the eye) prevents any possibility of splitting the stone, while at the same time it causes it to hang perfectly true on the crank.

"Another improvement is in the use of a single wheel friction roller, instead of the ordinary double one, thereby reducing the friction just one-half, and enabling the farmer (with the use of a treadle) to grind any small tool without calling off some one from his work to 'turn the grindstone.'

"No grindstone should be exposed to the weather, as it not only injures the wood-work, but the sun's rays harden the stone so much as in time to render it useless—neither should it run in water, as the part remaining in the water softens so much that it wears away faster than the other side, and many a "soft place" in a stone has risen from this cause alone, and not from any inequality in the grit. The proper way is to allow the water to drop on the stone, as it is needed, either from a cast-iron water cup, or (what answers very well) an old white-lead keg, supported above the stone with a spile near the bottom, which can be driven in when not needed, and if kept filled with water will last a long time. Finally, the stone should not be allowed to get "out of round," as no tool can be properly ground unless the stone runs true; if it should become uneven, get some one to turn it, and with a nail rod raze it down until it becomes perfectly round. Greasy or rusty tools should be well cleaned before grinding, or they will choke up the grit. If this should occur, a little sharp sand and water on a board and kept against the stone while turning, will clean it off and sharpen up the grit."

Where California Gold goes.

Among the other humiliations to which this nation has been subjected by the failure of our naval vessels to clear the ocean of the *Florida*, the *Georgia*, and the other insignificant rebel privateers that have been preying for nearly three years upon our commerce, is the revolution that has been worked in our California gold trade. Four-fifths of the gold product of the Pacific coast is now shipped to England and to other foreign ports, instead of coming to the Atlantic ports as it did before the war. The following table will show the course of this great revolution in the shipment of our bullion since the American flag on the sea has ceased to afford security to an American cargo.

Shipments of specie from San Francisco for the first six months of 1861, 1862, 1863 and 1864:

	To New York.	To England.	To China.	To other Countries.
1861.	$15,916,290	$1,103,938	$1,343,247	$202,655
1862.	11,290,850	4,216,841	1,007,272	317,652
1863.	5,650,976	15,008,427	1,603,059	495,119
1864.	5,607,940	19,835,269	2,911,733	578,798

See how in the foregoing exhibit the shipments to New York diminish year by year, and how the exportations to England swell up from one million in 1861 to nearly twenty millions in 1864. In the first six months of 1861 four-fifths of all the treasure sent out from San Francisco came directly to New York, but in the corresponding six months of 1864 nearly four-fifths of the California bullion is sent abroad and nearly three-fourths of it goes directly to England. A part of this great change is doubtless due to the marking out of new channels of trade, but by far the greater part of it is chargeable upon the fact that "American bottoms" are insecure for shipments of specie since our good friends in England have furnished to Jeff. Davis fleet-footed piratical craft with which to plunder our merchantmen and run away from our cruisers. It is by no means a pleasant subject for contemplation.

BOLLS of ripe cotton in fine order, of this year's growth, are exhibited in New Orleans.

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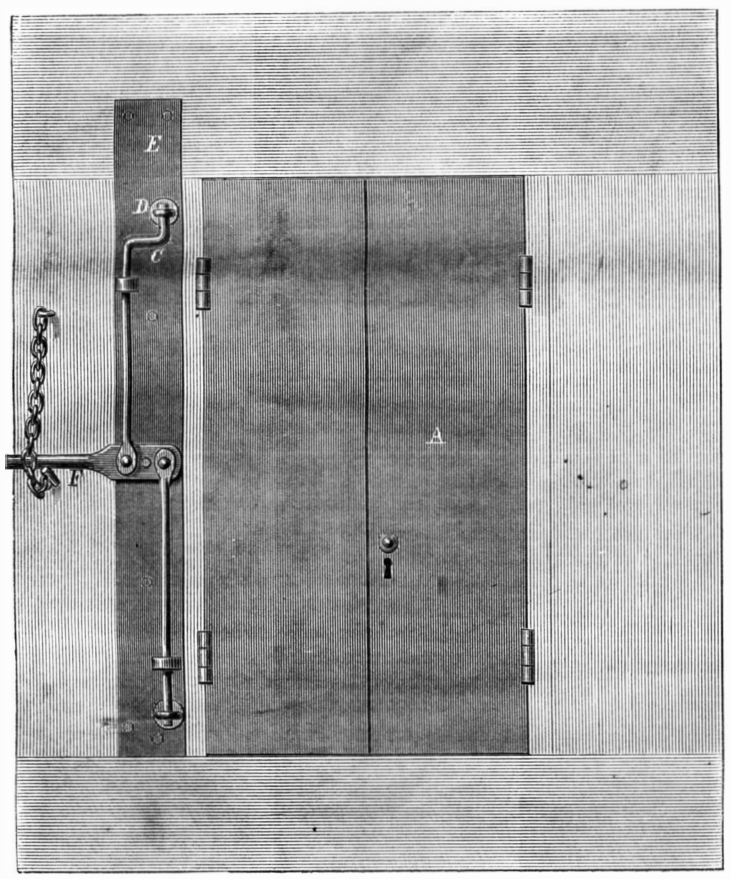
Improvement in Church Doors.

The terrible catastrophe in Santiago, Chili, by which hundreds of young women and children lost their lives through the burning of a church, is still fresh in the minds of the public. It will be remembered that on the occasion in question the great crowd of people within the building choked and jammed the doors so that they could neither get out or allow others to help them from the exterior. The church doors were so small that this catastrophe was much more fatal to life than it would have been otherwise. The engravings published herewith represent an ingenious plan for increasing the area of doors of public buildings, so that in case of disaster, when people lose their presence of mind, the simple withdrawal of a bolt causes the entrance to be much enlarged. This plan is shown in Fig. 2, the section, where it will be seen that the ordinary door, A, is set in its frame, B, as usual, but this frame, instead of being a fixture, as others are, is also furnished with hinges, so that when the confining bolt, C, is withdrawn, the whole frame, door and all, swings outward, *not inward*, and thus very much facilitates egress. The eye-bolts, D, Fig. 2, project through the plate, E, Fig. 1, and the confining bolt, G, which is worked by the lever, F, passes through both bolts, top and bottom, so that but one motion of the lever is required to open both bolts; as soon as this is done the door becomes self-locking. This is a much-needed improvement, and was patented through the Scientific American Patent Agency by A. H. Wagner, of Detroit, Mich., on May 10th, 1864.

For further information address the inventor at Box 64, Detroit, Mich.

Fig. 1



WAGNER'S IMPROVEMENT IN CHURCH DOORS.

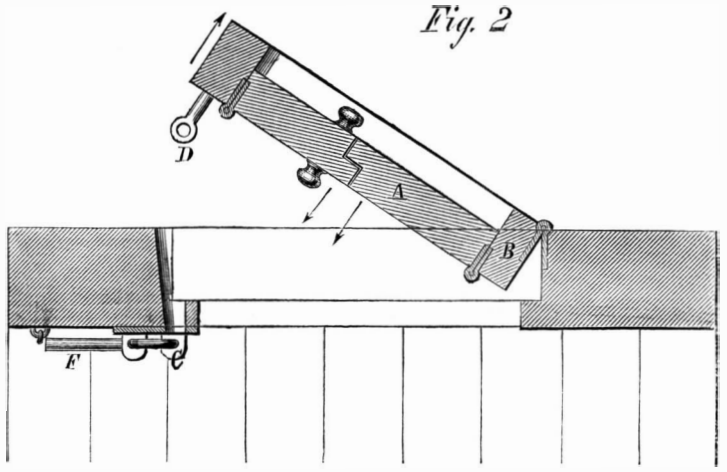
Improved Paint-Brush Guard.

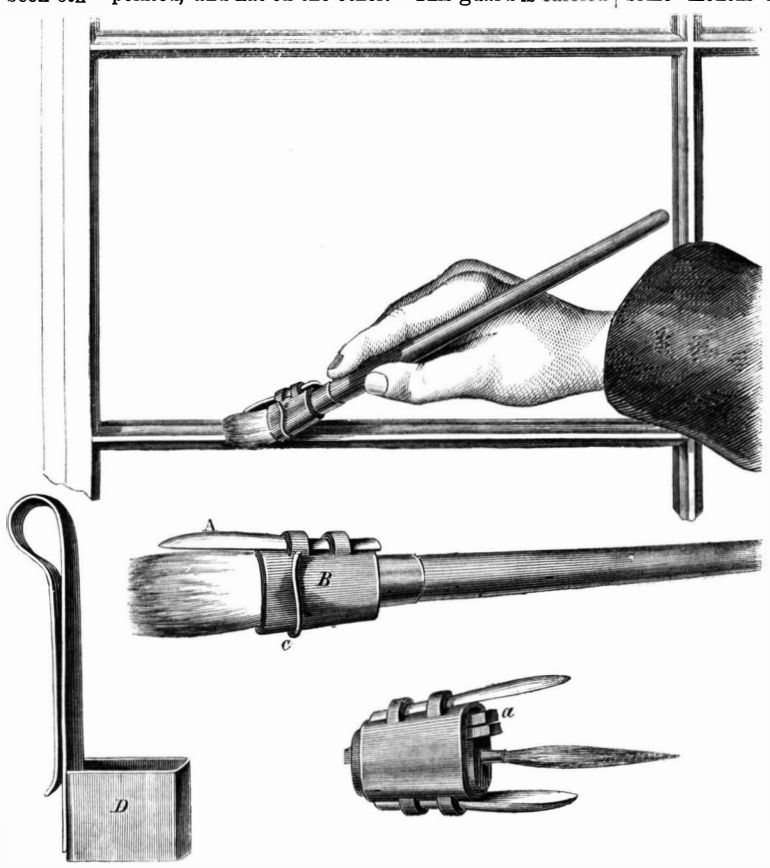
Any one who has watched a painter at work upon a window-sash, must have noticed the care taken to avoid daubing the panes—the necessity of cleaning them where the brush strikes adding very much to the labor of the painter and cost of the work. The attachment to the brush shown in the engraving is an exceedingly useful thing—one of those small matters which are often the foundation of fortunes. It is merely a piece of bone, A, half round on one side, pointed, and flat on the other. This guard is carried in an elastic rubber band, B, by making two slits in the same; the guard is then pushed through this band, which holds it firmly in place. A spring, C, is slipped over the band itself to compress it, but this is hardly necessary as the band is firm enough without it.

The manner of using this brush is shown so plainly in Fig. 1 that no further explanation is needed. The brush and guard are shown clearly in Fig. 2. When machinery or vehicles have to be striped, it needs a steady hand and close watching to do it well with the ordinary brush, but with the guard attached to a striping brush, as shown in Fig. 3, any one can stripe as handsomely as an expert. The guard can be adjusted to strike fine parallel lines by the keys, *a a*; when these are pushed in, the guard is pressed out from the brush so that a new line line is formed, when the brush is drawn along the work again. With this guard a man can stripe work when he cannot see the color of the paint, so well adapted is it for its purpose. One guard runs alongside of the edge of the work while the other guard remains upon it. The little dipper, D, for paint, is used in connection with this guard itself. Painters who have used this invention testify to its very great usefulness, and we can add our recommendation to those of practical men, with great satisfaction.

The invention was patented through the Scientific American Patent Agency on March 1st, 1864, by E. C. Haserick, of Lake Village, N. H.; for further information address him at that place.

Fig. 2





HASERICK'S PAINT-BRUSH GUARD.

Fragrant Hay.

The editor of the New Bedford (Mass.) *Standard*, some months ago, spoke of a practice pursued by Gen. Thompson, of that place, in putting up hay, and says the General filled his office with delicious fragrance by bringing in a sample of hay cured by the following process: The grass cut about 11 o'clock in the forenoon of a day in July, was *immediately* packed closely in a cask, the head of which was at once put in, its hoops driven and the cask rolled into a shed. There it remained untouched until January, when it was opened; and its contents were as sweet as the day when they were first packed. There was all the freshness, greenness and aroma of new-mown hay—not a suspicion of mustiness nor a sign of decay—it was bright, flexible and juicy. At the present price of casks this mode of curing hay would be expensive; but our neighbor suggests that grass, cut as this was, might be screwed into bundles in the field, and thus be equally well preserved.

["Beater" hay presses accomplish the object very thoroughly. There are bales of hay a few doors from our office which have been packed in such a press; they are so solid that they were sawed in two; and letters have been cut in them as if they were stone.—Eds.

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VOL. XI. NO. 9....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, AUGUST 27, 1864.

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IRON PLATES NOT INVULNERABLE.

On another page we republish from the London *Times* a full description of the complete destruction of a most massive iron-plated target by a 600-pound shot. This result will be regarded by the ordnance officers of our army as a confirmation of the soundness of the views which they have been urging for many years. **The charge was 40 pounds of powder** and the shot struck the target with a velocity 840 feet a second. Our officers have long been contending for very heavy shot at moderate velocities in preference to lighter shot at higher velocities. Major Barnard, in his "Notes on Sea-coast Defense," presents the case thus—the italics are his own:—

"A leaden bullet fired from a pistol will penetrate a pane of glass by a clean round hole; the same thrown by the hand will *smash* it to fragments. To *damage* a vessel seriously it is not the hole-puncturing property which we need, it is *the smashing* effect, *the staving-in* of planking and timbers; or, if a hole alone is made, that it shall be so large as to defy plugging. Of course, it is the larger projectile *only* that can make the large hole; and all experience (as well as theory) tells us that, for *smashing* effects, large *masses* with moderate *velocities* are the most efficient."

Again he says:—

"When these iron-clad ships come to 'engage, at breaching distance, our earth or stone forts,' and to have their 'laugh' at them, we do not try to *punch* holes in them; we wish to stave in the whole side. For this purpose masses of *large diameter* moving with *moderate velocity* are indispensable. The 15-inch shell would probably be effectual against the inclined-sided battery, and would be likely to convert Captain Cole's cupolas into *shooting-caps* indeed. Penetrating and exploding in an iron-clad or wooden vessel, a single one would probably suffice.

"Fifteen inches is the caliber of the gun made as an experiment to test the practicability of casting guns of extraordinary caliber, and their efficiency. The result has convinced our ordnance officers that it is not an extreme limit. A 20-inch gun can probably be made, and not only *made* but *used* with facility and efficiency. Enormous and expensive as they are, such guns may have their 'mission,' and a few of them in our important sea-coast batteries will probably be hereafter deemed an essential part of their armament."

On the other hand, the ablest of the English journals have argued that the effect of a given quantity of powder would be equally destructive whether behind heavy or light shot. This striking experiment in England is confirmatory of the conclusions from experiments with heavy shot in this country.

It is possible that the turrets of the *Dictator* and *Puritan* would resist even the 600-pound shot fired at the velocity of 840 feet per second, though it would undoubtedly go through the sides of either of these vessels. And what effects it would have on the turrets if fired with 80 pounds of powder we cannot tell. Even with 40 pounds it would probably penetrate the turrets of the small monitors, or shatter them to pieces.

PEACHES.

The peach crop has proved this year to be a most abundant one, and it is literally retailed by thousands of bushels all over the city. Carts perambulate the highways and byways loaded so that the springs touch, and almost every urchin has his pockets full. Business men go hurrying along with their hands full of peaches, and the monotonous cry of the vender is heard from morn till sultry eve—a dewy eve is unknown at present in this locality. The price is remarkably low considering the state of the currency, good fruit being sold for fifteen cents per quart, or twenty-five cents for two quarts. When we reflect that New York is but one city, and that there are other large ones—Baltimore, Philadelphia, Albany, and Boston—where the papers assure us the fruit is also abundant, we can form no estimate of the peach crop of 1864.

Of course peaches preserved in the ordinary way with sugar, pound for pound, are not to be thought of now, and they are neither good nor wholesome when they are so made—a thick, heavy, indigestible and tasteless conserve being produced. The proper way to preserve this delicious fruit is in small jars with very little sugar. Our readers may have seen small glass barrel-shaped mustard pots. These are just the things for the purpose in the absence of air-tight jars, which are beyond the means of some. The glass mustard pots could be had in ordinary times for three cents each, and can now be sold for at most six cents, cork and all. The way to preserve peaches in them is as follows:—Peel them nicely, split them in half and take out the stones; split each half again and put one-fourth of a pound of sugar to each pound of fruit, even less than this will do—as the fruit is naturally sweet it may be kept without any sugar whatever. It is safest however to use a little. Scald the peaches, but do not boil them, then take a table-spoon and put each quarter in the mustard pots, which must have previously been placed in a kettle of water and allowed to heat gradually to the boiling point. After the quarters are all in, fill up the crevices with juice, to within one-fourth of an inch of the top and continue the boiling under the pots when the contents will rise. Scalding the peaches drives the air out of the quarters and the boiling subsequently perfects this process, so that in about thirty minutes the corks can be put in. The corks should be soaked in hot water which makes them soft and easily compressed, and they must be driven in tight. The juice will be displaced at the top and overflow, but it must be wiped off and the pots taken one by one and dipped instantly in a pot of resin and beeswax, or tallow, which closes all the pores in the cork and makes it absolutely air-tight. The cement should be made just so as to be tough, not brittle; it is easily tried by dipping a little in cold water.

Three pounds of peaches cost now about twenty-five cents, stoned and peeled. The sugar for this amount would cost twenty-four cents; the sirup will increase the weight nearly one pound, and even at present prices we shall have four pounds of delicious sweetmeats at a cost of twelve cents per pound. Dried peaches cost at all times thirty cents per pound; next winter they will be dearer still. Which is the cheapest—dried peaches or "peaches in juice," as the French call them?

ONE of the Kindergartens, in Boston, has adopted the system of graduating the school hours to the age and advancement of the pupils, and the results have been most favorable. The youngest children come only from 9 to 12 A. M., those next them come one hour in the afternoon also, and the oldest two hours.

CAN WE FLY BY STEAM?

If we could make a machine the power of which should bear as large proportion to the weight as the muscular power of a bird does to its weight, we could fly. It would be interesting to know how nearly we can come in the present state of the arts to making such a machine.

The London *Engineer* says that large locomotives weighing 35 tuns, have been worked up to 1000-horsepower—less than eighty pounds to a horse-power. If a small steam engine could be made as light in proportion to its power, we should have a practical flying machine. Great progress has been made within a few years in the construction of light steam engines for fire-engines, and the *Engineer* describes one weighing 35 cwt. that gave 35 indicated horsepower. So it seems an engine of 35-horse power has been made nearly as light in proportion to its power as the 1000-horsepower engine.

But in order to fly we want an engine weighing only 200 or 300 pounds, and yet as powerful, or nearly so, in proportion to its weight as the large engine mentioned above. If an engine of 2-horsepower could be constructed to weigh only 300 pounds, with its water, and a little fuel, it would raise its own weight 220 feet in a minute, drawing itself up by a pulley over a rigid support. If by beating the air it would raise itself twenty feet in a minute, or would raise itself at all, it would fly.

How much power would have to be expended in beating the air in order to raise a given weight we have not the data for determining; but it is probable that some of our readers could easily ascertain. The form of wings for a flying machine is indicated with great certainty by our present knowledge. It is that of a light spiral fan, and there must be two fans to each machine to prevent the machine from turning instead of the fan. Now, if some of our readers who have the proper tools will make a fan, like a spiral windmill, and will measure its thrust when driven by a given power, they will settle this branch of the inquiry. Perhaps the simplest plan for making this measurement would be to fix the blades of the fan to a hollow sleeve, which could slide along the shaft on which it was supported. Let the sleeve be long enough for a cord several feet in length to be wound upon it, and then a heavy weight attached to the end of the cord will turn the fan. By weighing the weight and measuring the time of its descent, the power consumed in driving the fan will be ascertained. The force of the thrust may be measured by holding the sleeve from sliding along the shaft by means of a spring balance. By employing different weights the thrust at various velocities might be measured.

Some of our boiler-makers can doubtless tell us how light the boiler for a 2-horsepower engine can be made. To carry water enough for half an hour's running will be sufficient, or even for fifteen minutes. If we can once accomplish the great feat of flying we may trust to further improvements for the power of traveling greater distances, and in fifteen minutes we might go fifteen miles. If an iron boiler and engine is not more than three times too heavy, by the substitution of aluminum the weight of metal would be reduced to one-third, and the thing would be done.

It may be that no small steam engine can be constructed with a tenth part of the power in proportion to the weight requisite for a flying machine, and it may prove that even this familar motor in its present condition comes nearer the power to fly than any of us have supposed. At all events, it will be interesting to know how near we are in the present state of the arts to the possession of this enchanting power, and we hope some of our readers will take sufficient interest in the subject to give us the several facts, when we will put them together.

RED SEALING WAX of good quality is made by carefully fusing a mixture of 48 parts of shellac, 19 of Venice turpentine, and one of Peru balsam, to which 32 parts of finely levigated cinnabar and some sulphate of lime are afterwards added. In the cheaper kinds red lead is substituted for the vermilion, and there is much common rosin, which causes the wax to run into thin drops when melted. Black sealing wax is made of 60 parts of shellac, 10 of Venice turpentine, and 8 of finely levigated ivory-black.

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RUSSIA AND THE UNITED STATES--AMERICAN SOLDIERS.

We are indebted to the author, Rev. C. B. Boynton, D.D., of Cincinnati, for a copy of his work on the relations of the United States and Russia to the other great Powers. It is a book of 576 pages, printed in large clear type, and published by C. F. Vent & Co., of Cincinnati.

The work is devoted to an examination at length of the attitude and resources of England, France, Russia and the United States. The author argues that England is reduced to follow in the wake of France, that France is endeavoring to establish her own power over the christian world, that the natural opponents of this movement are Russia and the United States, and finally that there ought to be harmony of action between us and Russia.

The author has devoted much labor to the collection of his facts, and he lays them before his readers in a very easy and flowing style. We give the following extract as a specimen:—

"Eastern and Western soldiers have fought under very similar circumstances, with results so similar as to forbid either boasting or complaint. They sustained alike the honor of our flag. Gettysburg and Chickamauga were not only the great battles of the war, but, in each case, the best troops of the South were matched against the best of the North. The North and South were fairly represented on these bloody fields, and the main features of the fighting were the same. One was fought mainly by Eastern troops, and the other mostly by soldiers of the West. In each battle the fiery and yet orderly rush of the Southern veterans, led by their most trusted generals, was checked and rolled back with terrible slaughter by the persistent firmness, the long-enduring courage and skill of the Northern troops; and the two battles were a true type of the war.

"The Southern charge comes with the sweep and roar of a headlong torrent, but the Northern lines are granite, upon which it dashes and breaks. The men of the West fought, it is true, under great disadvantage at Chickamauga. They were outnumbered nearly two to one from the first, according to the statement of General Rosecrans, and nearly half of the army on the second day was shaken from its position; but the left, under Thomas, showed the true qualities of Northern soldiers, by hurling back charge after charge of Longstreet's chosen men, the very *elite* of the Southern army, and in numbers more than double their own, and compelling them to withdraw after five hours of the bloodiest fighting of the war.

"In these two battles the fighting qualities of the North and South were tested, with the advantage of numbers on the side of the South, and with results that show the superior steadfastness and endurance of Northern troops. The South will not believe, hereafter, that it can beat a Northern army on an equal field.

"Nor are Northern soldiers at all deficient in those qualities which most distinguish the armies of the South. The storming of Fort Donelson, the rush of Grant's army round to the rear of Vicksburg, and the running of the batteries at New Orleans, Port Hudson, and Vicksburg, have not been matched by any Southern exploit, while the history of war scarcely shows anything more brilliant than the dash up the steeps of Mission Ridge, and the storming of Lookout Mountain. The South has performed nothing which can bear comparison with these. and the military superiority of the North has, at length, been fully established."

SPECIAL NOTICE.

JUNIUS JUDSON for himself and WM. M. & JAMES L. JUDSON, administrators of Alfred Judson deceased, of Monroe county, N. Y., has petitioned for the extension of a patent granted to them on Nov. 5, 1850, for an improvement in valves for governors.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Oct. 24, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the final hearing.

WHERE THE DAY CHANGES.

MESSRS. EDITORS:—I would regard it as a favor if you will give me your opinion on the following question:—Supposing a man in a balloon above New York city asks a man in that city, "What time is it?" His reply is "Noon, Aug. 1." Supposing the balloon not to revolve with the earth, where is the man that would tell him it was Aug. 2nd? E. W.

Salem, Ohio, Aug. 5, 1864.

When it is noon Aug. 1st in New York, it is eleven o'clock of the same day at a point 15 degrees west of New York, and one o'clock of the same day at a meridian 15 degrees east of New York. On the meridian 90° west it is 6 A. M., and on the meridian 90° east it is 6 P. M. of the same day. At the antipodes it is midnight; and if we should go round east 180 degrees we should expect to find it midnight at the end of Aug. 1st, while if we go should go round west to the same point, we should expect to find it midnight at the beginning of Aug. 1st— 24 hours difference in the time. A minute afterwards a person coming round by the east would commence the day of Aug. 2nd, while one coming by the west would commence the day of Aug. 1st.

When the emigrants from the center of civilization in western Europe moved east and west, they carried their calendar with them in both directions to the Pacific Ocean. A few years ago we saw the statement in the letter of some traveler, that the change in the date takes place near the western shore of the Pacific, not far from the eastern edge of Asia. The writer said that there were two islands not fifty miles apart which always have different days of the month and of the week. It is Monday in the westwardly isle on the same day that it is Sunday in the island situated further east.

THE "TALLAHASSEE."

A new rebel ship has appeared off our coast, and is now plundering and burning all American vessels that she can come across. The captain's name is John Taylor Wood, and he says he does not like the work he is engaged in; he added quite naturally that he would not fight unless compelled to, he preferred to run away. It was doubtless to facilitate his speed that the rebels in England gave him the heavy armament he carries, which is as follows:—One pivot gun, three forward guns, and one brass rifled gun, of large caliber. The *Tallahassee* can steam 16 knots an hour, her captain says, and he avers that he has destroyed no less than fifty vessels in one week. The captain also states that there are other rebel ships afloat which will soon be heard from. The *Tallahassee* is an iron screw steamer, built in England (of course), and is schooner-rigged. She has about one hundred men; this sensitive pirate, who feels so badly about destroying the vessels of his country, allows no swearing on board, and doubtless prays on every convenient opportunity.

The Navy Department has ordered the following named vessels in pursuit of this craft:—The *Juniata, Susquehanna, Eolus, Pontoosuc, Dumbarton, Tristram Shandy, Moccasin, Aster, R. R. Cuyler, Yantic, Grand Gulf, Dacotah,* and *San Jacinto.* The most of these are heavy sloops-of-war, and if they fall in with the pirate will make short work of him. As a sop to keep the people quiet, we have the gratifying assurance that "heavy firing has been heard off Montauk." We hear some very heavy firing in the City Hall Park every morning.

A GOOD IDEA.—At the State Alms House, Massachusetts, the manager of the farm beds his cows regularly with sand, which he considers superior to any other substance for that purpose. It is warm, easy to lie upon, prevents the cows from slipping when reaching for food, is an excellent absorbent of liquids, easily shoveled in and out, a superior divisor of droppings, and is an excellent substance to apply to cold lands. For these reasons he likes sand for bedding.

MR. TEGETMEIER, before the Etomological Society, maintained that bees have no instinct in shaping their cells, as has been usually supposed, but the form is the consequence of the law or property of space, that of seven circles of equal radii, six will just surround the seventh. The cell of the bee is invariably hemispherical at its commencement, and the section of a cell not in contact with another always circular.

The Rat Riot.

The unsightly barracks, which have so long encumbered the Park grounds in front of our office, are at last demolished; and in common with our neighbors and the rest of the city we are rejoiced at their removal. It was announced in the daily papers that the lumber would be used in the construction of similar buildings on the Battery, but from observations we made on the spot, the timber took a very circuitous route to go to the place designated. All the slatternly old women in the neighborhood deserted their lawful avocation of selling apples, when the shanties began to come down, and falling on the timbers bore them away in triumph. Regular fatigue parties relieved each other at this pastime, and quite a respectable building was piled up under a large tree. It was amusing to see the struggles between these viragos and the workmen; one of the former would seize some fragment which in turn would be snatched from her by the men, then the whole force of Amazons would rally and make common cause until the coveted piece was captured.

Another feature in the destruction of these buildings was the immense quantities of rats unearthed and annihilated. Men and boys joined in killing them, and the ground was covered with the slain. Some mischievous person suddenly seized one of the defunct rodents and sent him flying at a comrade; others, acting on this hint, did likewise, and staid sober citizens, plodding about their business were astonished and bewildered by receiving a blow on the side of the head from these ill-smelling missiles. Any specially-marked or curiously attired individual was certain to be made a target of, and the shower of rats that fell upon him from all quarters caused him to retreat in a manner more hasty than dignified. From the frantic gesticulations and astonishing plunges and grasps made by the assailed, the observer at a distance would suppose that a hornet's nest had suddenly discharged itself upon the performer of the gymnastics referred to. The police were at last obliged to interfere, and dispersed the crowd in short meter when they sallied forth upon the combatants, and soon routed the rioters and the rats together.

Petroleum in Wool-spinning.

We translate from *La Génie Industriel* the following description of a process patented in Belgium by M. Lepainteur, of preparing a compound for oiling wool before it is carded.

"The author operates the extraction of the fatly matter by employing the usual means, that is to say, by pouring into the cleansing waters sulphuric acid in the proportion of two thirds of a pound for each pound of oil in suspension. As soon as this fatly matter rises to the surface it is removed, and hydrochloric acid to the amount of a twentieth part of its weight is added. The mixture is poured into a boiler furnished with a double bottom, and heated by steam to a temperature of 212° to 220°, in order to drive off the small quantity of water contained in the oil. The heat also powerfully aids the action of the hydrochloride acid, which carbonizes the foreign matters, animal and vegetable, and these fall to the bottom of the boiler, forming a deposit which may be readily removed.

"Thus is obtained a liquid product, to which five per cent of petroleum, or benzine, is to be added at the time of using. The mixture forms a grease of a superior quality, which has a favorable action on both the wool and the cards, preserving the brilliancy of the teeth, and facilitating the stripping."

TURBINE WHEELS.—A correspondent sends us this question; perhaps some of the manufacturers of turbine wheels can answer him:—"With a pressure of 100 feet and 25 inches of water (that is, what water would run through a space five inches square and with six inches head on) what would be the power of a turbine wheel five feet in diameter? Also one using 144 inches of water, 50 feet pressure, and 7½ feet in diameter?"

A FRENCH gardener finding a piece of woolen cloth, which the wind had lodged in a tree, covered with caterpillars, acted upon the idea suggested, and placed woolen rags in several trees. Every morning he found them covered with caterpillars, which were easily removed.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week ; the claims may be found in the official list:—

Puddling Furnace.—This improvement relates to the construction of the boshes of the furnace, and the object of the invention is to so form the inner surfaces of the boshes that the said surfaces will serve to hold up in place and prevent the falling down of a protecting composition or layer. The boshes of ordinary boiling or puddling furnaces are commonly made of cast-iron, inclined and smooth on their inner or fire surfaces, and so constructed and set in surrounding fire-brick that a current of cold air circulates under the locks of the plates composing the boshes, and prevents them from becoming melted. As a further preventive against the destruction of the boshes it is common to "fix" or protect the boshes by placing against them a layer or layers of iron ore in lumps, while a layer of iron-scraps is placed upon the bottom or hearth. The ore and scraps are then partially proved and form a protection from the boshes and bottom, under the intense heat to which they are exposed during the subsequent process of boiling or puddling. The ordinary fixing or preparing of the furnace to receive a charge for puddling, is a work of much labor, requires from two to three hours' time, and involves the consumption of a considerable quantity of fuel. This improvement overcomes the above difficulties, dispenses with and saves the time, labor and expense of the usual fixing, and the attendant losses of fuel, ore and scrap-iron, etc. For this purpose the inside faces of the boshes are constructed with a series of step-like ridges, recesses or corrugations, which serve to hold or retain a protecting composition, which is thrown upon the said ridges, recesses or corrugations, and the hearth, preparatory to charging the furnace. The protecting compound is composed of lime, ore-clay, iron ore, tap cinder and iron scales. But any other suitable protecting medium or compound may be employed. Morgan J. Davies; of Zanesville, Ohio, is the inventor.

Cloth-shearing Machine.—This invention is an improvement upon the invention which constitutes the subject-matter of Letters Patent dated May 28, 1850. The improvement relates to the appliances for producing the automatic extension and contraction of the movable or flexible rest. The action of the mechanism for extending the rest is governed by what are termed "feelers" and when these have been applied as described in the aforesaid Letters Patent, from twenty to sixty of them have been used in a gang on each side of the machine, for the cloth to pass over. There have been two sources of trouble with these feelers, viz., first, the filling-up of the spaces between them with flocks and dust from the cloth, which necessitates frequent cleaning; and, second, the liability to breakage of the frames which contain them, owing to the distance between the feelers being too small for a sufficient thickness of those portions of the frame between which the feelers are placed. The object of this invention is to obviate these inconveniences, and to this end it consists principally in a novel mode of applying the feelers and combining them with the sliding bars which shift the movable rests, whereby the feelers at each side of the machine are made to effect all that has been accomplished with the larger number. It also consists in a novel mode of combining two feelers on either side of the machine to make them so operate that the movable rests are kept stationary except when the edge of the cloth runs uneven. It further consists in the employment in combination with the movable rests of sliding covers, which cover up all of the mechanism by which the said rests are operated, except portions of the feelers, and which serve to lead the lists or edges of the cloth to the feelers. Amasa Woolson, of Springfield, Vt., is the inventor.

Steam Valve.—This invention consists in a solid plug provided with a cavity and fitted in a case surrounded by an annular steam chamber furnished with three or more ports and divided off in three or more separate compartments, one to communicate with the interior of the cylinder, and one with the steam, and another with the exhaust pipe, in such a manner that the plug is relieved from all or nearly all pressure of steam, and therefore can be moved instantaneously, and by turning said plug over a small arc, the interior of the cylinder can be brought to communicate either with the steam or with the exhaust pipe, as circumstances will require. Wm. H. Akins, of Dryden, N. Y., is the inventor.

Machine for Cutting and Twisting Paper.—This invention relates to a machine for cutting paper from a continuous roll into strips of a suitable width and twisting the latter into threads or twine, to be used as such, or to be woven or knitted into any suitable fabric, the cutting and twisting operations being simultaneously performed. The invention consists in using with an ordinary throstle or spinning frame, a cutting device formed of a series of cutters working upon a cylinder, arranged so as to admit of the cutting and twisting operations being simultaneously performed. The invention further consists in a novel means employed for facilitating the twisting of the strips of paper. Isaac P. Tice, of New York city, is the inventor.

Feeding Mechanism of Batting and Lapping Machines.—This invention relates to that class of machinery in which fibrous materials are fed to rollers in a loose, light state, for the formation of filmy sheets, such for instance as laps in the manufacture of cotton into textile fabrics and batting used in the making of garments and for various other purposes. Machines for this purpose are composed of a rapidly-revolving cylinder, most generally toothed, two feed rollers for delivering the material to said cylinder and two wire-cloth drums. or one drum and an endless belt to receive the material from the cylinder and compress it into a filing sheet, lap or bat. The great difficulty attending the operation of this class of machines has been the uniform feeding of the material to the drums, so that the former will be evenly distributed over them, and the sheet, lap, or bat, be of a uniform thickness throughout its entire width. This difficulty is occasioned by the blast, produced by the revolution of the cylinder which takes the material from the feed rollers, being retarded at the sides of the case by friction, causing the blast at the center of the case to be stronger, the latter thereby throwing an excess of the material at the central part of the compressing drum or drums. The invention consists in a novel construction of the draught board underneath the feed rollers and cylinder, whereby a strong blast is obtained at each side of the case of the machine sufficient to compensate for the retardation by friction, and thereby insure an even discharge upon or to the compressing drum or drums. William Fuzzard, of Malden, Mass,, is the inventor.

MISCELLANEOUS SUMMARY.

WEALTH OF THE COUNTRY.—According to the census returns, the property belonging to the people of of the United States amounted in 1850 to $6,174,780,000, and in 1830 to $14,222,618,068; showing an increase in ten years of $8,048,825,840, equal to 130 per cent. This is exclusive of slaves, which were valued at 961 millions of dollars in 1850, and at 1,936 millions in 1860.

THE lead mines of Bleiberg, near Villach, are the most extensive in Austria, yielding annually 1,600 or 1,700 tuns of metal. The roof of the workings is formed of a dark brown marble, full of Ammonites, polished sections of which exhibit the most brilliant iridescence. This is the famous Lumachello, or fire-marble.

THE Boston *Bulletin* says the New York and New Haven R. R. Company lately received a new engine, which was built in Patterson, for which they are to pay $14,000, according to contract. The builders offered to keep it and pay the company $30,000.

[It would be interesting to know what kind of an engine this is.—EDS.

AN immense quantity of straw is being cured and bleached in Middleboro', Mass., and vicinity, to supply the place of imported goods. Foreign straw brings an almost fabulous price.

AN English steamer lately built has the escape-pipe leading from the safety valve, under water, so as to avoid the unpleasant noise caused by blowing-off in the air.

POTATO DIGGING MACHINES.—Moore's *Rural New Yorker* says to a reader, Minneapolis, Minn.:—"We do not know of any machine that digs and picks up potatoes, except humans and swine."

[We can inform the *New Yorker* that within the last two years three or four potato-diggers have been illustrated and described in the SCIENTIFIC AMERICAN. In the general scarcity of labor attention should be called to these machines.—EDS.

THE MONT CENIS TUNNEL.—M. Sommeiller, the engineer, who has a great share in the direction of the works at Mont Cenis, expresses his decided opinion that the tunnel will be opened in 1872. Only one-third of the undertaking is at present completed, but there is a steady advance in the result of the labor of each successive month, the gain in July, for instance, as compared with the preceding month, being ten meters.

FROM a document published by the men engaged in the "lock-out" of the Leeds, England, iron trades, it appears that the nine weeks' strike has cost them £6,746. That amount has been distributed to the men locked out during the period named. The balance in hand is now little more than £62.

THE HOTTEST DAY IN TWENTY-EIGHT YEARS.—Prof. Snell, of Amherst College, who has kept a meteorological register for twenty-eight years, says that Monday, the 1st of August, was the hottest day during that period.

ON some of the inclined planes of the Pennsylvania railroads the long bands for drawing up the trains are made of steel plates.

AT Summit, in Pennsylvania, a coal mine is burning which has benn on fire for the last eight years.

A LATIN GRAMMAR FOR SCHOOLS AND COLLEGES.—By Alfred Harkness Ph. D., Professor in Brown University, author of a "A First Latin Book," "A Second Latin Book," "A First Greek Book," etc. Published by D. Appleton & Co., 443 & 445 Broadway, New York. It is the aim of the author to present the study in a form simple, attractive, and philosophical.

ROBINSON'S ARITHMETICAL SERIES.—Published by Ivison, Phinney, Blackman & Oo., 48 & 50 Walker street, New York. This work was prepared to meet a demand in advanced schools for a larger number of examples for review and drill exercises.

ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING AUGUST 16, 1864.
Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

43,823.—Cigar Knife.—John H. Abbott, Frederick City, Md.:

I claim a machine for gaging the length and cutting off the ends of cigars, in the process of their manufacture, constructed and operating substantially as described.

43,824.—Cylindrical Steam Valve.—Wm. H. Akins, Dryden, N. Y.:

I claim the solid plug or plugs, E E', provided with cavities, e e', and fitted in cases, F F', with ports, f f* f** f' f'* f'**, to operate in combination with the annular steam chambers, g g', each divided off in three compartments, to communicate with the interior of the cylinder, with the steam pipe, and with the exhaust pipe, in the manner and for the purpose substantially as herein shown and described

43,825.—Manufacture of Wrought Cannon.—Horatio Ames, Falls Village, Conn.:

I claim, first, Giving a convex form to the face of the plate and rings after being welded, for the purpose set forth.

Second, The use of planed and turned rings, Figs. 3 and 4, and the heating of the same in an upright position, substantially as set forth, in combination with the pin, Fig. 7, and convex surface of the rings, as shown in Fig. 2.

43,826.—Pump.—Oren Baldwin, Summitville, Iowa :

I claim, first, The combination of a pen-stock, A, with the head, C, removable stuffing-box, g g', and detachable cylinder, D, constructed substantially in the manner described.

Second, The construction of the valve or piston of the pump, of two perforated disks, m m', of the same diameter as the pump cylinder, and with the aperture of one disk opposite solid portions of the other, these disks being applied to a stud, G, and operating substantially as described.

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43,827.—Self-feeding Breech-loading Fire-arm.—Albert Ball, Worcester, Mass.:

I claim the combination of the rack-bar, c, the spring presser, F, or its equivalent, and the impelling and retaining pawls, G H, the whole being applied to the magazine, B, and the trigger-guard lever, E, and so as to operate together and with the charging carriage, substantially as specified.

I also claim the combination of the pawl elevator, l, with the pawls, G H, and the rack-bar, c, and spring presser, F, when applied to a magazine, B, and triggor guard-lever, E, substantially in manner and so as to operate as specified.

I also claim the arrangement of the pawl spring, I, with reference to the two pawls, G H, whereby it is caused to operate both of them.

I also claim the combination of the magazine cover, R, and its band or attachment, S, with the separate tubular magazine, B, and the barrel, A.

43,828.—Shuttle Guide or Guard for Looms.—Sumner R. Bixby, Worcester, and Joseph B. Bancroft, Milford, Mass.:

We claim the combination of the clamp screen and nut and the arm socket or sockets, or the equivalents thereof, with the guard supports and the guard constructed and applied together, substantially as described, viz: so that the guard may be capable not only of being turned laterally, but of being moved longitudinally within the said supports, and either into or out of the socket or sockets, in manner and for the purpose specified.

43,829.—Billiard Table.—J. Davis Bradley, Washington, D. C.:

I claim, first, The iron frame, A, in combination with the adjustable legs, B B, substantially as shown for the purposes set forth.

Second, The combination of the removable cover, C, with the adjustable legs, B B, substantially as shown for the purposes set forth.

Third, The combination of the iron frame, A, the adjustable legs, B B, the removable cover, C, and the adjustable caster, G, substantially shown for the purposes set forth.

Fourth, The adjustable caster, g, provided with the lever, D, having a detached handle, n, and arm, h, working against a cam, m, or their equivalents, substantially as shown for the purposes set forth.

43,830.—Caster for Furniture, etc.—J. Davis Bradley, Washington, D. C.:

I claim, first, The cylinder, A, and piston, B, in combination with the double cam, C, substantially as shown for the purposes set forth.

Second, The combination of the wheel, D, with the piston, B, and cylinder, A, and cam, C, and wrench or lever, E, substantially as shown for the purposes set forth.

43,831.—Photographic Printing Frame.—Francis Burrows, Peoria, Ill.:

I claim, first, A spring diaphragm, moving in a recess which is lined with elastic material for the reception of the negative, substantially as described.

Second, An attached hinged shutter with stationary padding closing on the spring diaphragm, secured by a latch or spring snap, or its equivalent.

Third, A removable vignette panel with beveled opening widening towards the negative, and excluding all extraneous light, in the manner described.

43,832.—Hay-elevating Fork.—F. F. Calkins and D. E. Wing, Coxsackie, N. Y.:

We claim the bar, D, connected by a hinge or joint, a, to the handle, B, in combination with the bar, E, at the front of D, and the side bolt, F, or its equivalent, all arranged and applied to the fork, in the manner substantially as and for the purpose specified.

[This invention relates to a new and improved horse hay-fork for elevating hay and discharging the same into the mow by means of a horse. The object of the invention is to obtain a fork of the kind specified which will be simple in construction, strong and durable, and capable of being manipulated with the greatest facility.]

43,833.—Self-regulating Pressure Valve.—Augustine Campbell, Brooklyn, N. Y. Ante-dated Sept. 22, 1862:

I claim, first, A pressure regulator composed of a flexible diaphragm, and of the following elements combined and arranged on the opposite sides thereof as follows, to wit, on one side of said diaphragm a balanced valve connected thereto without packing, through a free communication between the proper surfaces of the valve and that side of the diaphragm, and on the other side of said diaphragm a loaded lever performing the double functions, 1st, of resisting the pressure upon the diaphragm with the force desired; and 2nd, of indicating to the attendant when the pressure has reached, and approximately how much it exceeds that required.

Second, I claim so arranging the parts of the above described apparatus that water will accumulate, or may be introduced to protect the diaphragm from injury by the contact of the steam or other fluid, substantially in the manner herein set forth.

43,834.—Check Hook.—H. A. Collins, Springfield, Mass.:

In combination with a harness, saddle, and check hook, I claim a spring lever arranged to close or nearly close the hook, substantially in the manner and for the purposes set forth.

43,835.—Projectile for Rifled Ordnance.—B. C. Converse, Cincinnati, Ohio. Ante-dated Aug. 5, 1864:

In combination with a circular cutting edge and central projecting cone, constructed and combined as specified, I claim filling the annular cavity which surrounds the base of said cone with any soft substance, non-resisting to the impact of the projectile, as and for the purpose specified.

[This invention relates to a projectile having a central projecting point, wholly or in part circumscribed by a beveled cutting edge, so that when the projectile is fired against an iron plate or other body the point will indent or bend the same, and thus adapt the cutting edge to more readily penetrate it. In connection with the above the invention consists in filling the annular cavity around the projecting point with wax, tallow, or analogous material, in order that the said cavity shall not retard the flight of the shell.]

43,836.—Cultivator.—John Cox and John A. Throp, Three Rivers, Mich.:

We claim, first, So constructing the axle, C, that it constitutes a rocking lever support for the frame, A, and driver's seat, G', and a means by which said frame can be raised or depressed, substantially as herein described

Second, The combination of the lever, D, or its equivalent, with an axle, the points of support of which for the driver's seat and shovel frame are arranged on opposite sides of the fulcrum, or axis of motion of said axle, substantially as described.

Third, Arranging the driver's seat and frame of the machine upon a supporting axle in such manner that the weight of one can be made to counterbalance the weight of the other, whether the point of rest of the driver's seat be on the opposite side of the fulcrum from that upon which the frame rests, or directly over the fulcrum, or at any point between the fulcrum and the frame, substantially in the manner set forth.

Fourth, The connecting or stray rod, F, or its equivalent, in combination with the driver's seat, sustained substantially as described.

Fifth, The combination of pivoted lever, H, loop, j, slide, J, guide rod, J', shovel standards, a2 a2, pivoted stray rods, a3 a3, and wooden pins, n n, all constructed and arranged substantially as described.

43,837.—Meat and Vegetable Cutter and Grater.—Ephraim Culver, Shelburne, Mass.:

I claim the combination and arrangement of the trough, b, with the knife, i, and the grater, h, and the polishing wheel, c, substantially as and for the purposes herein set forth

43,838.—Water Wheel.—Daniel Doncaster, Punxsutawney, Pa.:

I claim, first, The flanged sliding rim or plate between the bucket wheel and concave of a turbine water wheel, substantially as and for the purpose described.

Second, The combination of a conical hub on the main shaft with a beveled flanged top in the guide plate to form a water-tight joint between the shaft and plate, and permit the removal of the latter with ease, substantially as set forth.

43,839.—Thread-winding Device for Sewing Machine Bobbins.—Frederick H. Drake, Middletown, Conn. Ante-dated Aug. 4, 1864:

I claim the employment of a pressure pad, in combination with a horizontal shaft or axle, having thereon an adjustable grooved roller is a guide to the thread, for the winding of thread upon the bobbins of sewing machines, as is described in the above specifications and accompanying drawings.

43,840.—Double-barrelled Breech-loading Fire-arm.—Wm. H. Elliot, Plattsburgh, N. Y.:

I claim, first, So constructing the joint of the arm that while in a proper position for firing it holds the barrel and breech-piece firmly together, but when the barrel or barrels are turned over they readily separate, as and for the purpose herein set forth.

Second, The employment of stop, f, in combination with locking lever, m, for locking the barrels in the lateral positions, as and for the purpose herein specified.

Third, The employment of one or more cams, b, in combination with the center pin, c, as and for the several purposes herein set forth.

43,841.—Railroad Signal.—Lewis Fitzpatrick and Wm. Gardner, Nicholsville, Ohio:

We claim the arrangement of the treadle or trigger, F, connected by devices, C H I I' J K L M, or their equivalents, to a bell, N, suspended near a railway crossing, by which the said trigger is depressed, and the bell rung by all trains approaching the crossing and only deflected by trains leaving the crossing, substantially as set forth.

43,842.—Means of affixing Propeller Blades to the Shaft.—L. B. Flanders, Philadelphia, Pa.:

I claim, first, A propeller composed of blades fitted on, and secured directly to, an enlarged portion of a propeller shaft by pins passing through or fitting in the said shaft, and arranged apart from each other, all as set forth.

Second, The combination of the journal, n, shoulders, x, chambered bearing, B, and the rings, p, to which a constant pressure is imparted through the elastic mediums described, or their equivalents, all being constructed substantially as described.

43,843.—Wind Wheel.—F. G. Fowler, Mechanicsburg, Pa.:

I claim, first, The springs, b, connecting with the vanes, C, at points on either side of the line of their axes in combination with said vanes hung on pivots at points outside their longitudinal centers, and revolving with the shaft, A, in the manner and for the purpose substantially as herein specified.

Second, The tension regulators, d, in combination with the springs, b, and vanes, C, hung as described, and applied in the manner and for the purpose substantially as set forth.

43,844.—Churn.—D. Frey and Delos Sanders, Homer, N. Y.:

We claim, first, The use of a shifting pinion, F, or its equivalent, in combination with devices applied to the dasher and beaters for driving them, substantially as described.

Second, Communicating a reciprocating motion to the dasher through the medium of a driving wheel, E, shifting pinion, F, pin, i, and thimble, G, substantially as described.

Third, The pivot-bearing-box, b, and removable pin, b', applied to the staff of the dasher, substantially as and for the purposes described.

43,845.—Feed Mechanism of Batting Machines.—Wm. Fuzzard, Malden, Mass.:

I claim the employment or use, in machines for forming fibrous sheets, of a draught board or draught plate, provided with a recess of V-shape, or an equivalent form, to increase the length of the draught chamber from a central line outward towards each side, substantially as and for the purpose herein set forth.

43,846.—Spinning Machine.—Albert H. Gilman and James S. Berry, Biddeford, Maine:

We claim the combination applied to the reciprocating mangle-wheel, I, and the gear, H, of the shaft, F, the same consisting of the pinion, r, the sectional gear lever, C, the escapement wheel, v, its shaft, u, and pinion, w, and the tripper, c, the whole being arranged and so as to operate substantially in manner as herein-before described.

We also claim the arrangement of the sectoral lever, C, with respect to the main shaft, F, and the gear, H, thereof, substantially in manner as specified.

And we also claim the combination of the studs or stops, d' e', with the sectoral lever, C, and gear, H, the mangle wheel, I, the shaft, F, the pinion, r, the wheel, v, the shaft, u, pinion, w, the tripper, c', the spindle rail and its connections with the shaft, F, the purpose of such stops being as hereinbefore described.

43,847.—Liniment.—Julia E. Gould, Jamestown, N. Y.:

I claim a liniment composed of the ingredients, and in the proportions herein set forth.

43,848.—Loom.—George Hancock, Holyoke, Mass.:

I claim the combination of variable eccentrics with the lifter and depresser rods, respectively, and actuating the harnesses thereby, substantially as and for the purposes set forth.

43,849.—Rotary Pump.—Wm. Hinds, Little Falls, N. Y. Ante-dated Aug. 1, 1864:

I claim, first, The combination and arrangement of the cylinder, E, drum, N, valves, v v, and abutment, k, substantially as shown and described.

Second, I claim the arrangement of the above described parts within a chest, the induction port of which is above the induction port of the pump so that the pump may be kept submerged when at rest, or when being transported from place to place, in its ordinary use.

Third I claim in combination with parts, E N v v and k, the chain, A, spur wheels, B B, shaft, s, and wheel, C, as connected with shaft, f.

Fourth, I claim the combination with said chain, as arranged, of handles, substantially as described.

43,850.—Water Wheel.—Wm. Hinds, Little Falls, N. Y. Ante-dated Aug. 8, 1864:

I claim the funnels or passages, F F, for conveying the water away from the wheel after its force has been expended in turning it, when the funnels are combined with the wheel, substantially as described.

And also in combination with the funnels, F F, and water wheel, I claim the chutes or sluices leading from the ports, m and n, all of which is constructed substantially as and for the purposes set forth in the specification.

43,851.—Metallic Cartridge.—John C. Howe, Worcester, Mass.:

I claim the combination of a perforated diaphragm with the rear end of the shell of a cartridge case, in such manner that the diaphragm forms a perforated partition between the primer, and the powder is rigidly secured to the cartridge case so as to support the primer against the blow of the hammer, and by its breadth of rim protects the part of the cartridge case surrounding it from the explosive force of the powder, substantially as set forth.

I also claim a cartridge case constructed with a groove in its periphery behind the position of the charge, substantially as herein set forth.

I also claim a cartridge case constructed with projections in its interior, substantially as herein set forth.

43,852.—Soap.—Henry Huntington, Chicago, Ill.:

I claim the manufacture of a "laundry soap," by the combination of the following ingredients: ordinary soap, concentrated lye, bi-carbonate of potash, spirits of turpentine or kerosine oil or benzole, and aqua ammonia in the proportions, and substantially as and for the purposes herein set forth.

43,853.—Reducing Stems of Tobacco Leaves.—Wm. W. Huse, Brooklyn, N. Y.:

I claim the employment in combination of two rollers or wheels, the periphery of one being grooved to receive and guide the stem of the leaves, and the periphery of the other being formed with a fillet or bead to fit in the said groove to crush the stem, substantially as described.

And I also claim the cutting edge on one of the rollers or wheels for splitting the stem in combination with the groove and bead or fillet for guiding and crushing the stem, substantially as described.

45,854.—Caliper.—C. Jillson, Worcester, Mass.:

I claim prolonging and forming upon the legs of the inside calliper the dividing points, g g, as and for the purpose described.

I also claim the rounding off of the points of the outside calliper, from the outside towards the inside of the bows when used in connection with a scale for the purpose of more accurately registering the distance between the contact points as the calliper is widened, as herein set forth and explained.

43,855.—Window Screen.—Albert Josselyn, Pembroke, Mass.:

I claim the combination and arrangement of the screen, c, the stile, d, the stock, j, the rollers, h and i, and the ratchet wheel, n, and pawl, o, as an "improved mosquito screen," adapted and adjustable to windows of various widths, substantially as set forth and described.

43,856.—Blast Regulator.—Abraham Kipp, Jr., Sing Sing, N. Y.:

I claim regulating the pressure of steam in a steam boiler by the employment or use of an outside power transmitted by a suitable medium, such for instance as the belt, m, in combination with the lever, A, or its equivalent, and with the mechanism required to change the motion of the shaft, j, substantially as herein specified, so that the change in the motion of said shaft is produced by the direct action of the steam, whereas the power requisite to throw the belt or shift the cut-of is derived from an outside source.

[The object of this invention is to control the position of the belt which imparts motion to the fan blower or other blast machine of a steam boiler furnace, by the pressure of the steam, so that when the steam rises and the pressure reaches a certain point, said belt will be thrown off and the motion of the blast machine stopped, and when the steam goes down, the belt will gradually be put on and the blast machine started.]

43,857.—Ventilating Attachment for Bedsteads.—John H. Martin, Hartford, N. Y.:

I claim, first, The two bars, D H, of the device applied to the side rail, A, of the bedstead, substantially as shown, to admit of being adjusted in a horizontal and vertical position, and provided with the expanding arms, M, and cords, i, to which the bed-clothes are secured, all being arranged substantially as and for the purpose specified.

Second, The legs, J J, attached to the slide, I, and fitted in dovetail grooves, f, in the block, G, in connection with the cam, K, or its equivalent, substantially as and for the purpose set forth.

Third, The combination and arrangement of the block, G, rod, F, and hinged block, E, and the rod, C, in the socket, B, as shown, for the purpose of admitting of the latent adjustment of the bar, H, and the consequent oblique adjustment of the device relatively with the bedstead, substantially as described.

[The object of this invention is to obtain a device of simple construction which may be applied to a bedstead in such a manner as to be entirely out of the way of the occupants of the bed and be capable of raising and opening the bed-clothes at any time when desired, for the purpose of airing or ventilating them, and at the same time be capable of holding the bed clothes in proper position on the bed when the latter is in use. The invention is designed to supersede the laborious hand-work in making beds, and to afford facilities for airing and ventilating the bed-clothes so that the same may always be in a cleanly and wholesome condition.]

43,858.—Whip Socket.—Charles B. Morehouse, New Castle, Ind.:

I claim as an article of manufacture the clamps or arms, B and b, and the nuts, C C, substantially as described for the purpose of attaching a whip socket to a dash without making a hole in the leather or dash.

43,859.—Lubricator.—Henry T. Neuss, Williamsburgh, N. Y.:

I claim the combination of the spring valve oil cup, pulley or wheel, G, and shaft, P, substantially as described, so that while the oil is confined from dust and other matters by the spring valve, the lubrication will be controlled by the shaft, as set forth.

43,860.—Manufacture of Paper.—Samuel Noulon, New York City:

I claim, first, The combination with a paper-making machine of otherwise ordinary or suitable construction of cutting rollers, operating in the manner and for the purpose described.

Second, In combination with the cutting rollers, I claim the steam heated calenders and endless aprons, under the arrangement and for operation as set forth

43,861.—Apparatus for drying Bricks, etc.—S. M. Parish, Baldwinsville, N. Y.:

I claim the combination of the adjustable supports, G, and connecting rod, H, with the carriage, E, and tracks, B B, arranged and operating substantially as and for the purposes set forth.

I also claim the combination and arrangement of the series of covered tracks, B, adjustable loading stays, G H, with movable extension rails, B', and posts, A, stringers, I, and return track, c, substantially in the manner and for the purpose shown and described.

43,862.—Water Elevator.—Dan Perry, Pawtucket, R. I.:

I claim, first, The pulley, C, provided with or composed of oblique plates, c, fitted between disks, b b, arranged to operate upon the bucket chain or rope, in the manner substantially as and for the purpose set forth.

Second, The adjustable supplemental pulley, E, arranged to operate in connection with the pulley, C, substantially as and for the purposes set forth.

Third, The strap or bucket retaining mechanism, composed of the cam, K, on the shaft, B, the stationary cylindrical box, L, attached to the curb, concentrically with the shaft, B, the rollers, M, interposed between the cam and the box, the pins, l l, on the flange, k, of the cam and the pins, m, on the plate, O, of the crank, N, all arranged to operate substantially as set forth.

Fourth, The friction rollers, l, placed on the ends of the projections, h' h', for the purpose herein specified.

43,863.—Equalizing the Temperature of Milk.—Stuart Perry, Newport, N. Y.:

I claim the employment of a partition having graduated openings through it, and placed between the vat containing the milk, and the heater that heats the water by which the milk is heated, the smaller openings being more directly over the fire or source of heat, and the larger openings more distant therefrom, substantially as and for the purpose set forth and explained.

43,864.—Pea-sheller.—George B. Price, Watervliet, N. Y.:

I claim the employment of the elastic surfaces, D E, for the purpose of shelling green peas, beans and podded substances, substantially in the manner shown and described.

I also claim the employment in combination with the said elastic surfaces of a feeding and also of a discharging device, operating substantially as herein shown and described.

43,865—Washing Machine.—Horace Prindle, Spafford, N. Y.:

I claim the construction of a washing machine provided with the adjustable rubber, D, when combined with the standards, R R, roller, E, provided with slats to receive said standards and the corrugated end, B, in the manner and for the purpose herein specified.

43,866.—Medicine for Cure of Scarlatina, Sore Throat, etc.—Mary Ann Ragsdale, Grass Valley, Cal.:

I claim the ointment and gargle compounded as herein described, the same being a new manufacture.

43,867.—Machine for trimming Corks.—Benjamin T. Roath, Norwich, Conn.:

I claim the rotary disk, D, provided with the clamps or holders, F, in combination with the circular rotary cutters, I I, all arranged to operate substantially as and for the purpose herein set forth.

[This invention relates to a machine for trimming the ends of corks, that is to say, for cutting their ends parallel with each other. The invention consists in the employment or use of a rotating disk provided with clamps or holders so arranged and operated that they will receive and hold the corks while being cut, and release them after being cut and using in connection with said disks and clamps circular rotary cutters; all being arranged in such a manner that the work may be done rapidly and in a perfect manner.]

43,868.—Take-up Motion for Looms.—L. L. Shaw, Lewiston, Maine:

I claim the adjustable rest, f, and adjustable pins, g g, on the revolving arm or disk, h, in combination with the lever, C, pawls, e, ratchet wheel, f, and cloth beam, B, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[The object of this invention is to impart to the cloth beam

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loom an intermittent rotary motion which is positive in working and which can be readily adjusted to make thick or thin cloth without requiring any change of gears.]

43,869.—Weed-puller Hoe.—Nathan Ames, Saugus Center, Mass.:

I claim, first, The combination of the nipper, D, or its equivalent, with a hoe or other analogous tool or tools, substantially as and for the purpose described.

Second, Actuating the nipper by means of the cord, f, or its equivalent, reaching up to the operator's hand, substantially as described.

43,870.—Apparatus for making Paper Collars.—David M. Smyth, New York City:

I claim the reciprocating plunger with its cutting edge inclining downwards from the middle towards each end in combination with the mortise in the bed formed with a sharp and square cutting edge constituting, as described, a pair of shears, to cut the collars by a shearing cut from each end towards the middle without bending the paper at or near the edge, as described.

I also claim in combination the embossing dies, the punches for punching the button holes, and the punching shears for cutting the collars in succession from a sheet of paper, as described.

And I also claim in combination with the bed and follower of a paper collar embossing machine, the twisted wires for embossing the surface near the edge in imitation of stitching, as described.

43,871.—Process of tempering Steel.—Ariel B. Sprout, Hughesville, Pa.:

I claim a solution of soap suds or the component parts thereof, adapted to be increased or diminished in strength when employed as a medium for tempering steel in order to give it any degree of hardness, and prevent the same from cracking or checking during the tempering process, as explained.

43,872.—Marine Steam Boiler.—Alban C. Stimers, Castleton, N. Y.:

I claim so arranging the tubes as to result in regularly increasing the vertical water spaces between the tubes in what is known as the horizontal fire-tube boiler, from the lower to the upper part thereof, and furnishing a greater cross area for the flow of the heated gases through the lower than through the upper tubes, all for the purposes, and in the manner substantially as described.

43,873.—Floating Device.—G. W. Talcott, Buffalo, N.Y.:

I claim first, The vertically bisected arch or arches, B, in combination with the barges or hulls, A A, when the same are so constructed that the sections may be disconnected and swung on board the vessels for sailing or connected with corresponding sections on another vessel to from a complete arch, substantially as and for the purpose set forth.

Second, I also claim, in combination with the bisected arch or arches, B, the tubular turn-table, D, arranged and operating substantially as and for the purposes described.

Third, I also claim, in combination with the bisected arches, B, the tackle, L, and movable bearings, E E', arranged and operating substantially as and for the purposes set forth.

Fourth, I also claim in combination with the adjustable turn-table, D, the chocks, or bearings, H H, for receiving the weight of the arches, B B, and their burthen directly on the sides of the vessels after the turn-tables have been lowered away, substantially as described.

Fifth, I also claim working the arch sections, B, in or out board on the barges, A A, by means of the rack on the cord, d, and pinion on the bracket, J, or their equivalents, substantially as and for the purposes set forth.

Sixth, I also claim the hoisting apparatus consisting of the drums, L L' L'', pinions, p p M, in combination with the divided swinging arch sections, B, and tackle, L, substantially as set forth.

Seventh, I also claim the combination and arrangement of the movable tackle bearing blocks or carriages, E E,' with the truss brace, K, which forms a track for the same, substantially as shown and described.

Eighth, I also claim forming the arches, B, divided at the base or chord and united at the crown for the purpose of giving greater steadiness and stability, substantially as described.

Ninth, I also claim the self-connecting grapple, Q, constructed substantially as described, for fastening to projecting parts of a wreck without the aid of a diver.

Tenth, I also claim the diver's grapple, S, consisting of the stock, w, toggle bar, x, and brace, y, for fastening to the side of a vessel, as set forth.

Eleventh, I also claim the clutch ring, F, constructed with the yoke, v, in combination with the chain, G, tackle block, L, tripline, b, and guy, a, arranged and operating substantially as set forth.

Twelfth, I also claim the combination of a series of swinging bisected arches, B B, tackle, L, grapples, Q and S, with hoisting machine and engine for each arch section, and the two hulls or barges, A A, all arranged and operating together, for the purpose of raising sunken vessels, etc., substantially as set forth.

43,874.—Cutting and twisting Paper.—Isaac P. Tice, New York City:

I ciam first, The combination of a paper-cutting device and a throstle or spinning frame, arranged substantially as shown, for the purpose of cutting paper into strips from a continuous roll, and twisting the same into threads or twine, the work being done simultaneously or at one operation, substantially as herein set forth.

Second, the pointed cylinders, H, applied to a throstle or spinning frame in relation with the paper strips, a, to operate substantially as and for the purpose herein set forth.

43,875.—Expansive Envelope.—Roswell Van Buskirk, Newark, N. J.:

I claim the folds, c c c, and the tag, D, for the purposes herein specified.

43,876.—Writing Desk.—James S. Watson, Newton, Mass.

I claim the combination and arrangement of the flexile cover (for the inkstand and pen case) with the drawer, so as to be operated thereby and with respect to the inkstand and pen-case of the writingdesk, substantially in the manner as hereinbefore specified.

And I also claim the arrangement of either or both the slanting covers, E E', of the desk with the flexile cover, in manner substantially as described, that is, so that the said flexile cover when closed shall rest upon and close down such slanting cover or covers, as specified.

43,877.—Shuttle for Looms.—Warren Wilder, Wilkinsonville, Mass.:

I claim the combination of the spindle head, a, with the heel, c, upper extension, 2, spring plate A, pivot, G, spring catch, D, when constructed and arranged as herein described.

I also claim the combination of the top spring, E, with the extended head, 2, and projecting heel, c, of the spindle head, substantially as and for the purposes described.

43,878.—Cloth-shearing Machine.—Amasa Woolson Springfield, Vt.:

I claim first the attachment of the feelers to the gage bars, e e, or their equivalents, substantially as and for the purpose herein specified.

Second, The two feelers, B B', combined with each other by means of a slot, i', and pin, i, and combined with the mechanism by which the shifting of the movable rests is effected by means of a double ratchet or its equivalents, substantially as herein specified.

Third, The sliding cover, M M', applied in combination with the feelers and rests, substantially as and for the purpose herein specified.

43,879.—Lamp Burner.—John H. Wygant and Charles W. Vanderbeck, Hackensack, N. J.:

We claim the employment or use in connection with a lamp-burner provided with a draught chimney, of a match igniting device so constructed and arranged in such relation with the wick tube thereof, that a friction match may be inserted into the burner from its outer side by hand and be ignited, and by such insertion be brought in contact with the wick to light the same, substantially as herein set forth.

[This invention consists in applying to lamp-burners, such as are employed for burning coal oil with a draught chimney, a match igniting device, arranged in such a manner that the match may, without disturbing the draught-chimney or any part of the burner, be thrust into the burner, ignited and brought in contact with the top of the wick so that the same will be lighted.]

43,880.—Puddling Furnace.—Morgan J. Davies (assignor to himself and William T. Davies,) Zanesville, Ohio:

I claim the construction of the inside faces of the boshes of iron with projecting recesses, ridges, or corrugations, set at any given angle to prevent the falling down of the protecting compound, substantially as herein shown and described.

I also claim the use of a protecting compound in combination with boshes that are ridged or corrugated, as above described, all as set forth.

43,881.—Fire-arm.—Ralph Graham (assignor to himself and Samuel Booth,) Brooklyn, N. Y.:

I claim first, A hand fire-arm adapted to projecting grenades or small bombs, consisting of a barrel sufficiently short to prevent injurious recoil against the person as set forth.

Second, I claim the hammer, e, rod, g, and trigger, f, in combination with the short barrel mounted at the end of the stock, as and for the purposes specified.

43,882.—Stone-crushing Machine.—Loomis G. Marshall (assignor to himself and Andrew Cochran,) New York City:

I claim the arrangement and combination of the movable boxes eccentric shaft, and working jaw, all as herein described and for the purposes set forth.

43,883.—Machine for Cutting Ovals.—Charles W. Packer, (assignor to himself and George Bates,) Philadelphia, Pa.:

I claim the combination for the purpose specided of rotating knives, J J, with a plate, F, which is caused to traverse in an oval course, by the devices herein described or any equivalent to the same.

43,884.—Machine for conveying Warp-beams from one Machine to Another, &c., in Factories.—Benjamin Saunders, (assignor to Albert H. Saunders and Geo. Draper,) Nashua, N. H.:

I claim the said machine constructed substantially in manner and so as to operate as and for the purpose specified.

43,885.—Manufacture of Dry Molds for Casting, etc.—John P. Townsend, of New York City, assignor to Tappen Townsend, Brooklyn N. Y., and Charles Sears, of Middletown, N. J.:

I claim first, Making durable dry molds for casting metals in crucibles, pots and like articles, of a composition of fire clay, soap stone and umber, in the manner and proportions of material substantially as described, whether the said mold, crucible or like article be made in one or several pieces.

Second, I claim the combination of plumbago and paste and their equivalants for making the facing or glazing of dry molds, crucibles, pots and the like articles, as described.

Third, I claim the manufacture and use of molds, crucibles, pots and the like articles, made of fire clay and soap stone with or without a portion of quartz sand, substantially as described.

43,886.—Device for Turning Spheres or Balls.—Daniel E. True, (assignor to himself and George T. Lincoln,) Leominster, Mass.:

I claim the combination of the adjustable tool-carrier, D, and its adjusting mechanism, viz., the screw, E, and nut, F, with the rotary shaft, B, the same being as and for the purpose specified.

I also claim the rotary shaft, B, as made with the crook or bend, a, when such shaft is combined with the tool-carrier, D, for use, substantially as explained.

I also claim the combination and arrangement of the stop screw, H, with the rotary shaft, B, the tool-carrier, D, and its adjusting mechanism.

I also claim the combination of the stops, I K, with the rotary shaft, B, the tool-carrier, D, and its adjusting mechanism.

I also claim the combination of the thumb-lever, M, with the rotary shaft, B, the tool carrier, D, and its adjusting mechanism.

43,887.—Wash-board.—Geo. W. Witsil (assignor to himself and Clement Cresson), Philadelphia, Pa. Antedated Aug. 1, 1864:

I claim a wash-board having the concavities annular recesses and intervening ribs arranged substantially as set forth.

43,888.—Loom for making Fishing and other Nets.—B. F. Jouannin, F.M. Baudouin, and Achille Baudouin, Paris, France. Patented in England Sept. 19, 1861:

We claim, first, The employment or use, in a loom for making nets of a series of spools, a, carrying the warp threads in combination with a stationary comb, b, rods, c c', and rough surface roller, e, all constructed and operating substantially as and for the purpose set forth.

Second, The rod, d, in combination with the warp threads and rough surface roller, e.

Third, The friction driver, e*, and conical roller, e'*, in combination with the rough surface roller, e, and with the warp threads applied and operating substantially as and for the purpose set forth.

Fourth, The movable comb, f, in combination with the twisting hooks, g, and with the warp threads constructed and operating substantially as and for the purpose set forth.

Fifth, The hooks, g, hook box, g1, and rod, g2, arranged in combination with cam grooves, g4, and cam, g4*, in the manner and for the purpose, substantially as described.

Sixth, The toothed rack bar, g9, and cam groove, g11, in combination with the hook box, g1, applied and operating substantially as and for the purpose set forth.

Seventh, The straps, g6, and cam grooves, g8, in combination with the rods, g3, and hook box, g1, constructed and operating substantially as and for the purpose specified.

Eighth, The lugs, g12, with projections and corresponding cavities acting in combination with the bar, g13, and hook box, g1, in the manner and for the purpose substantially as described.

Ninth, The flanged circular shoes, h3, with notches, h4, in combination with the shuttles constructed and operating substantially as and for the purpose set forth.

Tenth, The hinged needles, h5, applied in combination with the shuttles, h1, in the manner and for the purpose substantially as specified.

Eleventh, The carriage, h7, and rails, h8, in combination with the shuttles, h1, and hooks, g, constructed and operating substantially as and for the purpose described.

Twelfth, The stretcher, i, arranged and operated in combination with the shuttles in the manner and for the purpose substantially as set forth.

Thirteenth, The combination of the adjustable take-up rollers, l l1 l2, with the hooks, g, and shuttles, h1, constructed and operating substantially as and for the purpose specified.

Fourteenth, The adjustable tappet, m, acting in combination with the pendent lever, n, pawl, n1, ratchet wheel, n2, and take-up rollers, l, l1, l2, substantially in the manner and for the purpose herein shown and described.

[This invention relates to certain improvements in the mechanism for forming the loops and tying the thread; also in the construction of the shuttles and the means employed for operating and moving the same; further, in the use of an automatic take-up regulator which also serves to regulate the length of the meshes; also, in a peculiar arrangement and disposition of the warp threads, whereby the length of the net can be made unlimited, and each thread can be readily tied in case it breaks; finally, to certain novel means for keeping the threads stretched and take up the slack.]

43,889.—Steam Engine.—Thomas McDonough, Middletown, Conn.:

I claim the chambers, substantially as above described, so arranged that the exhaust steam may also exhaust the chamber, and the steam, on entering, may reach the piston before the mixed air and steam.

RE-ISSUES.

1,737,—Revolving Fire-arm.—Ethan Allen, Worcester, Mass. Patented Sept. 7, 1858:

I claim the use of a guard or guards constructed and operating substantially as described and for the purpose specified.

1,738.—Revolving Fire-arm.—Ethan Allen, Worcester, Mass. Patented Sept. 7, 1858:

I claim the method of protecting the joints from fouling, between the revolving cylinder breech and the stationary parts contiguous thereto, in repeating fire-arms, by means of the inclined recess or recesses, or their equivalent, arranged and operating substantially as described.

1,739.—Draught Regulator and Ventilator.—Gardner Chilson, Boston, Mass. Patented April 29, 1864:

I claim the arrangement and combination of an annular air register, B G, and a damper, D, the whole being or to be applied to a smoke-pipe, A, substantially as described.

I also claim the combination and arrangement of an annular current guard, c, with an annular air register, B G, combined or to be arranged with respect to a pipe or conduit, A, and so as to operate therewith, substantially as specified.

I also claim the combination and arrangement of an annular current guard, c, and air register, B G, and a damper, D, the whole being or to be applied together and to a smoke-pipe, A, in manner substantially as specified.

I also claim the combination of the enlargement, a, or the additional space made thereby with the annular air register, B G, and the current guard, c.

I also claim the connection of the damper and the annular register valve by means of the slotted arm, E, and their pin, d, whereby both damper and valve may be moved simultaneously, as described.

I also claim the combination of the enlargement, a, or the additional space formed thereby, with the annular air register, B G, the curved guard, c, and the damper, D.

1,740.—Trimming the Heels of Boots and Shoes.—C. H. Helms, Poughkeepsie, N. Y. Patented March 12, 1861

First, I claim the use of the vertical sliding frame having a horizontal axis, on which to center the heel of the boot or shoe, in combination with a rotary cutter, arranged in a fixed standard, with its axis parallel with the axis of the sliding frame on which the shoe is centered, for the purpose of trimming the heel from end to end, as hereinbefore set forth.

Second, I also claim the use of the pattern plate when secured to the heel of a boot or shoe in a vertical position so as to obtain a center round which the heel turns, in combination with a guide roller on the axis of a horizontal rotary cutter, substantially as herein before set forth.

Third, I also claim the use of a shoulder or loose roller on the end of the cutter stock as a "counter" protector, in combination with a rotary cutter and a boot or shoe, when suspended vertically, so as to turn on an axis parallel with the axis of the rotary cutter, substantially as hereinbefore set forth.

Fourth, I also claim the use of the spring for supporting the sliding frame in a vertical position in the guide-ways of the standard with an elastic pressure under the action of the rotary cutter, in combination with the sliding frame of a boot or shoe heel-trimming machine, and the treadle for operating the same substantially as set forth.

DESIGNS.

1,982.—Toy Bow.—Isaac S. Clough, Brooklyn, N. Y., and Vincent Fountain, Jr., Castleton, N. Y.

1,983.—Statuette of Schiller.—E. J. Kuntze, New York City.

1,984.—Plate of a Stove.—Daniel E. Paris, Troy, N. Y.

1,985.—Floor Oil-cloth.—Albert E. Powers, Lansingburgh, N. Y.

1,986.—Plate of a Stove.—N. S. Vedder (assignor to D. E. Paris), Troy, N. Y.

EXTENSION.

Preparing the Face of Metallic Types.—Luke V. V. Newton, New York City. Patented Aug. 20, 1850:

I claim the plating or coating of the surfaces of metallic printing types, stereotype plates or other printing plates, whether cast or engraved, with an additional coat of metal by means of galvanic electricity in the manner and for the purpose described.

PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex.Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards

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illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design.	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might really be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American atent Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure there obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

Notes and Queries

T. J. B., of Mass.—The son can get a patent for his father's invention in the character of executor or administrator. He can, however, get a patent for any compound of his own invention by making application in his own name, and if the compounds are the joint invention of father and son, then the son must join with the administrator or executor of the father's estate in the application. A question would arise in the Patent Office whether so many years' public use (from 1859) would not work an abandonment of the invention to the public, as the law requires that an invention belongs to the public after two years public use, but if it could be established that the materials and proportions of the compound were never divulged, the Office might decide that the statute did not apply. If a patent is obtained, it runs from its date, and is not retroactive. A label or title to medicines and packages can be copy-righted, or if it is artistic in its design, can be patented as a "design."

Frankfort, Pa.—You will find a table of the strength of iron used for steam boilers on page 71, Vol. X, of the SCIENTIFIC AMERICAN. The machinist who told you that three-eighths iron was three-eighths iron, and would bear as much pressure in a large boiler as in a small one knew nothing of the subject.

J. S. H., of Tenn.—In reckoning the power of steam boilers 15 feet of heating surface is generally allowed for a horse power; some maintain that 10 feet is sufficient, but the best makers give 15 feet. You will find full directions for measuring or laying off the device known as "the Pittsburgh cam," on page 39 of King's "Steam and the Steam Engine;" the process is too long and not easily understood without the aid of diagrams. With these it is very simple. D. Appleton & Co., have the work for sale.

R. P. B., of Conn.—Petroleum may be burned under small steam boilers by the use of what is called a sand-wick, that is to say the petroleum flows into the sand and gives off its vapor so that the latter is easily ignited and burns with an intense heat We intend to investigate this subject and shall give an account of the results.

T. B., of R. I.—If you know the weight of the ball upon your lever, its distance from the center of the valve and the distance of the valve center from the fulcrum, you can find the weight on your valve by the following rule:—Multiply the weight in pounds by the distance in inches to the fulcrum, divide this by the distance between the fulcrum and the valve center, and the quotient, added to the weight of the valve and half the weight of the lever, is the weight on the valve.

E. L. F., of Maine.—One plan for compressing air is to let water into the bottom of a tight upright cylinder, when every 33 feet head of the water will give one atmosphere pressure. Or you may compress it by an air pump. The latter plan would cost the least, perhaps, in apparatus, though the work of compression would be more laborious.

G. H. C., of N. J.—We were not aware that zinc could be made negative to iron. Tin is negative to iron, and if you coat your zinc with a perfect stratum of tin, you may preserve it from the action of the acid. In your case we still suspect that the action must be on the zinc.

W. S., of Canada West.—We honor your benevolence to the disabled man. Advice in regard to procuring patents we make our specialty. There are numbers of persons who devote their time to selling patents, and some of them have made a good deal of money at it. Having no experience in that department we consider ourselves quite incompetent to advise you how to proceed.

C. S., of Cal.—We have no doubt that turbine wheels would be the best generally for the California quartz mills.

W. H. M., of Ohio.—A practical treatise on coal, petroleum, and other distilled oils by Dr. Gesner, has been published by Bailliere Brothers, 520 Broadway, New York.

J. H. T., of Mo.—Fans are best for forcing air against a moderate pressure, but if you wish to use the air to drive machinery you must employ a cylinder air pump.

H. J. C., of N. J.—All of the large modern works on chemistry contain the process for making alcohol from olefiant gas. You will find "Miller's Chemistry" in the library of the American Institute.

J. H. D., of Mass.—Gutta-percha is soluble in sulphide of carbon, spirits of turpentine and benzine. In our office the SCIENTIFIC AMERICAN is retailed at eight cents per copy.

D. F. R., of N. Y.—It is not necessary that an English invention should have been patented in Britain in order to have it received here. Any new and useful improvement is patentable but no person except the inventor can apply for a patent.

S. C. H., of N. Y.—We do not receive orders for blacking boxes, neither do we know the name of the party alluded to in our article. We mentioned therein that the person in question had as much as he could do for four years to come, so it is not likely that you could get any until that period had elapsed.

C. & L., of Conn.—These correspondents send us fifteen cents accompanied by a request to send them a paper containing a description of a weather indicator made on the principle of Prof. Agassiz. We cannot send such a paper for the reason that we do not know what one it is. To secure attention correspondents should give the exact name of the article, then we can find it in our index, but we cannot spend half an hour in hunting for something we don't know the name of, for fifteen cents.

G. W. S., of Pa.—We do not think it would make any difference about placing the steam pipe between the mud drum connections instead of directly over one of them, as it now is. If the engine works water it is because the steam room of the boiler is too small, to increase it put a dome on your boiler or employ a "dry pipe," which is merely a pipe close under the upper shell pierced with holes half an inch in diameter. Run the steam pipe from this and you will have no trouble.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Aug. 10, 1864, to Wednesday, Aug. 17, 1864:—

J. V. O., of N. Y., $20; A. W. H., of N. Y., $35; W. R. F., of N. T., $20; T. H., of Ohio, $20; W. C. B., of Cal., $20; A. M., of Ind., $20; H. & S., of Pa., $20; G. M. M., of Pa., $41; P. J., of France, $16; P. G. B., of N. Y., $15; E. B., of Conn., $20; W. M., of Mass., $20; D. E. B., of Ind., $20; B. & W., of Pa., $20; F. H. C. M., of N. Y., $20; E. N., of Prussia, $15; W. F. C., of N. Y., $40; C. & N., of N. Y., $22; F. L., of La., $20; A. E. W., of N. Y., $15; J. M., of Mass., $15; C. H., of N. Y., $20; J. W. N., of Mass., $40; S. E., of Pa., $20; S. C. K., of Mass., $20; J. L., of N. J., $15; W. G., of N. J., $15; J. R., of Mass., $20; E. H., of N. Y., $15; J. H. C., of N. Y., $20; J. M. H., of N. Y., $15; B. A. W., of Wis., $30; M. C., of Maine, $25; P. C. R., of Mass., $15; J. & W. C. S., of Cal., $20; D. A., of Pa., $15; W. R. M., of Pa., $8; E. B. B., of Ind., $15; H. B. H., of Mass., $15; T. E. R., of N. Y., $25; S. H. M., of Ill., $15; J. H. F., of Ky., $40; H. F. B., of Mo., $50; K. & F., of Ill., $15; H. K. A., of N. H., $30; H. B. S., of N. Y., $30; G. M. F., of Cal., $15; J. & W. F., of N. J., $22; W. F. P., of Conn., $15; R. L. S., of N. Y., $30; G. B., of Wis., $20; W. B., of Iowa, $16; H. B. M., of Mich., $15; C. & M., of Mass., $25; R. H., of Conn., $25; C. C. A., of Tenn., $21; T. R., of Cal., $16; J. M. H., of Oregon, $20; H. L. H., of Cal., $20; S. & B., of Conn., $15; F. & B., of R. I., $15; E. W. M., of Ill., $15; H. W. B., of N. Y., $15; J. G., of Ohio, $25; J. H., of Ohio, $15.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Aug. 10, 1864, to Wednesday, Aug. 17, 1864:—

R. L. S., of N. Y.; W. R. M., of Pa.; R. M., of Conn.; C. & M., of Mass.; H. K. A., of N. H.; R. T., of Minn.; J. T., of N. J.; T. E. R., of N. Y.; I. M. H., of Oregon; H. L. H., of Cal.; M. C., of Maine; S K. A., of Wis.; J. B. S., of N. Y.; W. L. & T. W., of London (2 cases); H. E. P., of Conn., (2 cases); J. J., of N. Y.; J. H. P., of N. Y.; B. F C., of N. Y.; N. & C., of N. Y.; G. M. M., of Pa.; H. S., of N. Y.; W. T. C., of N. Y.; H. S., of N. Y.; W. F. C., of N. Y.; J. H., of Ohio.

Binding the "Scientific American."

It is important that all works of reference should be well bound The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office' No. 37 Park Row, New York.

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TO OUR READERS.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, excepton design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

Back Numbers and Volumes of the "Scientific American."

VOLUMES III., IV., VII., IX AND X., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding VOLS. I., II., V., VI. and VIII. are out of print and cannot be supplied..

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

AGENTS WANTED TO SELL THE CELEBRATED Franklin Sewing Machine, on a salary or liberal commission. For valuable particulars, address Box 302, Boston, Mass. 9 10

CORN PLANTER—PATENT FOR SALE, ISSUED Aug. 9th, 1864. A one-quarter size working model can beseen Address F. LOOS, Germantown, Pa. 9 2*

WANTED.—THE ADDRESS OF A MANUFACTURER of Portable Muley Saw Mills. ALFRED M. SMITH, Clearfield Bridge, Clearfield county, Pa. 9 2*

TAKE IT AT ~~YOUR OWN PRICE~~, CASH OR BARTER.—A valuable House-keeping Patent, ten years to run for the entire United States. Needed by every family, and any woodworkman can make it. Send for circulars, PATENTEE, Box 207, Ripon, Wis. 1*

MANUFACTURERS OR FOUNDERS IN NEW ENGLAND wishing to engage to manufacture or cast a small article of hardware, weighing about one pound each, for which there is but a small demand, on addressing a line to PATENT RIGHT, Boston, Mass., will have a wood pattern furnished, when they can state their price. Would like to make a permanent arrangement with responsible parties, as the article is covered by Letters Patent. 9 2*

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IMPROVED FLAX MACHINERY, JUST IMPORTED, for Tow cleaning, 3 Strippers, 3 Workers, 1 Doffing Cylinder, and Iron Delivery Roller for sale. Apply to JAMES KERSHAW, 31 Spruce street, New York. 1*

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Refer to Chemical Bank and Metropolitan Bank, New York City. 8 eow tf

FOR SALE.—IN ONE OF THE MOST DESIRABLE parts of Maryland, a Foundry and Machine Shop, now doing a large and increasing business. Address WM. A. STEWART, 53 Fayette street, Baltimore, Md. 8 3*

FOR SALE.—ONE PAIR OF BLOWING CYLINDERS in complete working order; 4 feet diameter 4 feet stroke. Built at the Novelty Works, New York. One horizontal Engine, 16x36 inches in perfect order. Call or address DAVIS'S Machinery Yard, 17 and 19 Morris street, Jersey City. 8 3*

RACHET DRILLS.—CHARLES MERRILL & SONS, 556 Grand street, New York, Hardware Dealers and Manufacturers of a superior Rachet Drill. Orders solicited and promptly filled. Send for circular, giving particulars and prices. 8 4*

THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no second-hand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars address—

MUNN & CO.,
Publishers of the SCIENTIFIC AMERICAN,
No. 37 Park Row, New York City.

STATE OF NEW YORK, COMMISSARY GENERAL'S DEPARTMENT,
New York, August 9th, 1864.

PURSUANT TO AN ACT OF THE LEGISLATURE of the State of New York, passed April 25th, 1864, Proposals for the rebuilding, alteration, repairing, and reconstruction of the "Brooklyn Arsenal," situated in the City of Brooklyn, N. Y., endorsed "Proposals for the alteration, repairing, and reconstruction of the Brooklyn Arsenal," will be received at the office of the undersigned, corner of 35th street and 7th avenue, in the City of New York, until the 12th day of September next.

Plans and specifications are ready for examination at the above office, and the bids must be for the whole work. The right to reject any and all proposals is expressly reserved, and no contract entered into shall be binding on the State until the same shall have been approved by the Commissioners named in said act.

Good and sufficient surety will be required from the party or parties to whom said contract shall be awarded, to be approved by a majority of said Commissioners.

All proposals received will be opened at the office of the Hon. Lucius Robinson, Comptroller, in the City of Albany, on the 19th day of September next, at 12 M. JAMES A. FARRELL,
7 4 Commissary General of Ordnance, S. N. Y.

TO MINERS AND MINERAL WORKERS.—THE Boston Milling and Manufacturing Company, have erected steam mills and crushers at East Boston, are now ready to execute contracts for crushing and powdering quartz and other ores, of whatever nature, by the tun or by the thousand tuns. They will shortly be prepared, upon the completion of their desulphurizing and smelting furnaces, now in process of erection, to contract for roasting, amalgamating, and refining the precious metals, gold, silver, copper, tin, etc. Being now the sole owners of Whelpley & Storer's several patents for the treatment of minerals, and for the powdering of all hard substances, as bone, coal, fire clay, plaster, foul slag, emery, flint, feldspar, manganese, drugs, dye stuffs, etc., they offer for sale Patent Rights, and machinery for use.
SAMUEL STORER, Treasurer, 15 Merchants Row, Boston.
8 4

MILL STONE DRESSING DIAMONDS SET IN Patent Protector and Guide. For sale by JOHN DICKINSON, Patentee and Sole Manufacturer and Importer of Diamonds for all Mechanical purposes. Also, Manufacturer of Glazier's Diamonds, No. 64 Nassau street, New York City. Old Diamonds reset.
N. B.—Send Postage stamp for Descriptive Circular of the Diamond Dresser 8 2*

PATENT PORTABLE MOSQUITO NET OR INSECT Protector, weighs but 2 ounces, and can be carried in the pocket. It was illustrated in the SCIENTIFIC AMERICAN, July 23d, 1864. Sent anywhere in the United States, free of postage, for $1 each, or $9 a dozen. Address JOHN ZENGELER. Post-office Box 2,682, Chicago, Ill. 8 2*

RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y. The Forty-first Annual Session of this well-known School of Engineering and Natural Science, will commence Sept. 14th, 1864. The Principal Building is completed and ready for occupation. The New Annual Register, giving full information, may be obtained at Appleton's Bookstore, New York, or from Prof. CHARLES DROWNE, Director, Troy, N. Y. 6 8*

CAVALRY HORSES WANTED.

CAVALRY BUREAU, OFFICE OF ASSIST. QUARTERMASTER,
No. 18 State street, New York, June 10, 1864.

I WILL PURCHASE IN OPEN MARKET ALL THE Calvary Horses that may be presented and pass inspection at the Government Stables, corner of 10th avenue and 25th street, in this city, until further notice.

Payment will be made in checks payable in certificates of indebtedness, when seven (7) or more horses are received. Price, one hundred and sixty dollars each.

6 tf GEO. A. BROWNING, Capt. and Assist. Qr. Mr.

INCRUSTATION.—EIGHT YEARS' USE OF THE "Anti-Incrustation Powder" stamps it a standard article, effective and safe in its operations.
6 6* H. N. WINANS, 11 Wall street, New York.

GROVER & BAKER'S HIGHEST PREMIUM ELASTIC Stitch Sewing Machines, 495 Broadway, New York.
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OIL! OIL! OIL!
For Railroads, Steamers, and for machinery and Burning, PEASE'S Improved Engine and Signal Oil, indorsed and recommended by the highest authority in the United States. This Oil possesses qualities vitally essential for lubricating and burning, and found in no other oil. It is offered to the public upon the most reliable, thorough, and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only oil that is in all cases reliable and will not gum. The "Scientific American," after several tests, pronounces it "superior to any other they have used for machinery." For sale only by the Inventor and Manufacturer, F. S. PEASE, No. 61 Main street, Buffalo, N. Y.
N. B.—Reliable orders filled for any part of the United States and Canada. 4 tf

A VALUABLE PATENT FOR SALE. ADDRESS S. M. GOFF, East Addison, Addison county, Vt. 7 6*

THE RIGHT TO MANUFACTURE THE ST. CLAIR Harvester and my Patent Grain Drill, can be had on easy terms. W. P. PENN, Belleville, Ill. 7 6*

MACHINERY.—S. C. HILLS, No. 12 PLATT STREET, New York, dealer in Steam Engines, Boilers, Planers, Lathes, Chucks, Drills, Pumps; Mortising, Tenoning and Sash Machines; Woodworth's and Daniels's Planers, Dick's Punches, Presses and Shears; Cob and Corn Mills; Harrison's Grist Mills; Johnson's Shingle Mills; Belting Oil, &c. c

A MESSIEURS LES INVENTEURS.—AVIS IMPORTANT Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence. MUNN & CO.,
Scientific American office, No. 37 Park Row, New York.

VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them——Importance of the Specification—Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No 37 Park Row New York.

THE SEVENTEENTH ANNUAL EXHIBITION OF the Maryland Institute of Baltimore, for the promotion of the Mechanic's Arts, will commence Monday evening, Oct. 3d, and continue to Monday evening, Oct. 31st, 1864. The Hall will be open for the reception of goods on Monday, Sept. 26th. Goods for competition and premium must be deposited before Thursday night, Sept. 29th. Circulars, embracing details, may be had of the Actuary at the Institute. Communications addressed to the undersigned, or to WM. C. CORNTHWAITE, Actuary, will be promptly attended to.
3 11 W. W. MAUGHLAN, Chairman Committee on Exhibition.

BRASS PINION WIRE FOR GAS AND WATER Meter-makers made by PETER COLLIE, Clock Maker, No. 1,176 South 11th street, Philadelphia, Pa. Also Indicators for counting the revolutions of Machinery. Electric Telegraph Instruments or any kind of fine brass wheel works made to pattern. 7 7*

TO OVAL FRAME MANUFACTURERS.—WE CALL attention to a very superior Patented Eccentric Lathe and Machine for cutting oval and circular frames. For Machines and rights to use apply to ROBERT MARCHER & BRO., 221 West 26th street, between 8th and 9th avenues, where they can be seen in operation. 7 4*

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PLATINA FOR ALL PURPOSES.—ADDRESS H. M. RAYNOR, 748 Broadway, New York. 8 4*

ENGINEERS AND MACHINISTS WANTED FOR the United States Navy. Positions guaranteed before the 1st of September. Address, with two stamps, J. HARRIS, 355 North 10th street, Philadelphia. 6 6*

FOR SALE.—ONE PULLEY, 80 INCHES DIAMETER, 24-inch face, bored for 3⅞-inch shaft. Apply to "Providence Tool Company," Providence, R. I. 4 tf

NOTICE.—PARTIES HAVING EITHER AN IMproved Thrashing Machine, Farm Mill, or Cotton Gin to be introduced, may address "Patent Horse-power Company," 1,509 Pennsylvania avenue, Philadelphia. 4 6*

NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 1 12*

POWER LOOMS FOR SALE.—SIXTEEN SATINETT Looms, together with lot of pulleys and hangers. Manufactured by Alfred Jenks & Son. Address LOCK, Box 70, Lexington, Ky. 4 7*

IRON PLANERS, ENGINE LATHES, DRILLS AND other machinists' tools, of superior quality, on hand and finishing, for sale low. For description and price address NEW HAVEN MANUFACTURING COMPANY, New Haven, Conn. 1tf

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MANUFACTURERS OF STEAM ENGINES, WITH the link motion, variable cut off of the most approved construction; also Lathes, Mill-gearing, Shafting, Hangers and Machinery in general. Address M. & T. SAULT, New Haven, Conn. 19 26*

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REYNOLDS' TURBINE WATER WHEELS.—COMPETENT men are employed to measure streams, make plans, and put in flumes, wheels, and gearing. TALLCOT & UNDERHILL, No. 170 Broadway, New York. 1tf

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Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu addressiren an

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Preis 20 Cts., per Post 25 Cts.

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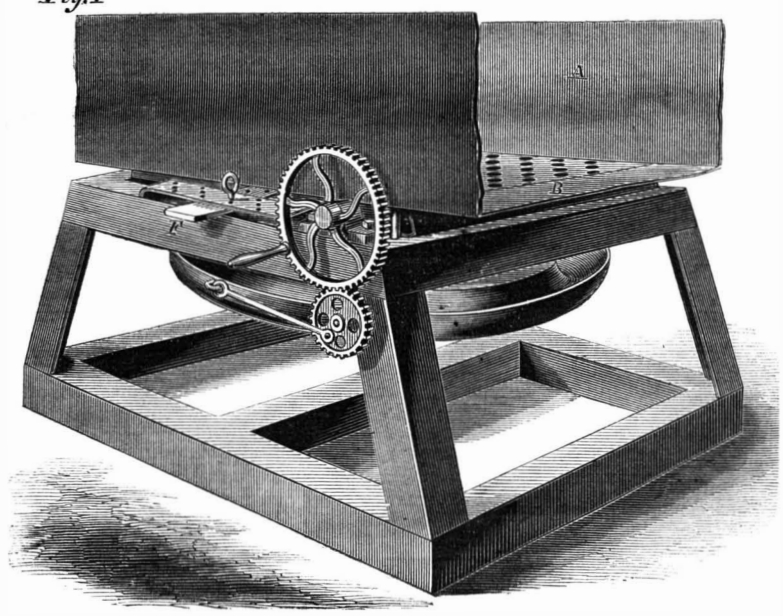
Improved Gold-washer and Separator.

The engravings published herewith represent a new form of gold-washer which possesses much merit and has been found efficient in use. The inventor's description is appended:—

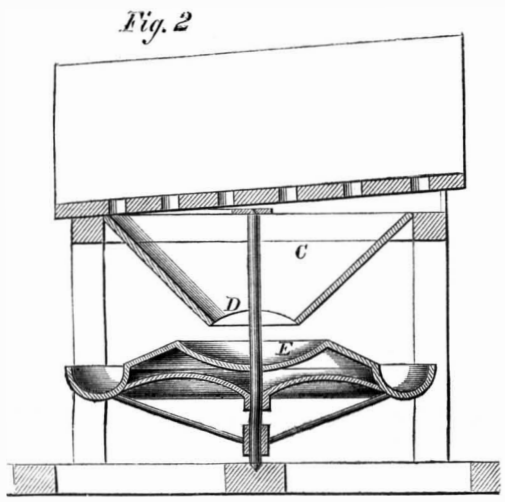
"Miners have always experienced great difficulty in separating gold from the earth with which it is mixed. The sluice with its riffles, and the various amalgamators, are the best machines that have heretofore been in use. The former becomes packed with black sand, etc., which renders it nearly useless except to save coarse gold, while the latter process will not save rusty gold nor that which does not come in contact with the quicksilver. This machine is designed, by the peculiar motion given to it, to settle the gold to the bottom of the separator, and, at the same time, prevent its becoming packed with ores. In nearly all mining districts there are more or less mining lands in which the gold is so fine and flat as to have received the term 'float gold,' very much of which it is impossible to save by the usual methods.

Fig. 1



HICKS'S GOLD-WASHER AND SEPARATOR.

Fig. 2



"It is acknowledged by experienced miners that this invention will facilitate the separating and saving of this kind of gold to such an extent as to redeem to profitable working thousands of acres which hitherto have not paid.

"The upper portion, A, is a section of a common sluice, with the bottom, B, perforated, through which the water, the smaller particles of gravel, etc., with the gold, pass; while coarser matters pass off down the sluice. The matter that passes through the bottom of the sluice falls into a rectangular pan, C (Fig. 2), having an opening, D, in the center through which it passes upon the center of the separator, E, below; this separator is circular and designed to be kept level by the shaft that passes through it. The upper end of the shaft runs in a bar, F, that can be moved in any direction, whereby the separator can be kept level without disturbing the frame. The center of the separator is depressed, forming a circular pan into which the matter from the rectangular pan above-mentioned, falls; this peculiarity of the center of the separator is designed to equalize the distribution of the dirt and water to all points of the circumference. From the center it is slightly declining. Next to the plane, outwardly, and forming the circumference of the separator, is a semi-circular depression. By the action of the gearing attached to the frame, the separator receives a combined reciprocal, horizontal, rotary and shaking motion, which settles the gold in the outward depression or pan. The idea is to settle the gold into the depressions by the motion of the separator, while the sweep of the water from the center of the separator to the circumference, combined with the tangential or centrifugal force given to lighter matter, results in the separation and retention of the gold in the outward depression or pan. Where water is scarce I design that the section of a sluice which will be provided may be closed up at each end, making a box, into which the dirt can be put and washed as is usual with a rocker. The motion to be given to the box by the gearing in an obvious manner or by a lever; the box should move on four rollers, two attached to each side bar of the frame. Where no water can be had for mining purposes, the tangential or centrifugal force given to matter by the motion of the separator, coupled with the elevation of the center of the separator, is of itself sufficient to separate the dirt from the gold, provided the dirt be thoroughly dried and pulverized. The amount of fall necessary to run one of my machines with twenty feet of sluice to wash the dirt in, attached, is but twenty inches, while it can be run with ten inches of fall and the same amount of sluicing, by setting the machine ten inches below the surface, though at the expense of fall for tailings."

This invention was patented by C. D. Hicks, on April 19th, 1864, through the Scientific American Patent Agency. For further particulars address L. B. France, Denver, C. T., or J. S. Hicks, No. 456 Sixth avenue, New York.

Something New.

The new railway coach on the Old Colony Road is a startling innovation in this country, and excites much attention on the road. People flock to the depots to see the wonder, and appear as much interested as passengers themselves. It is about the usual length, but entirely unlike the ordinary passenger car, being divided into separate apartments, with side doors to each and seats extending across the car, like a succession of stage coaches arranged on a platform. There are five apartments, to accommodate eight persons each, and one for twelve, with a center-table, and all the conveniences of a family parlor. In point of style and superb finish, nothing has been built in the car line in this country that can compare with it; the upholstering (which is of different material and colors for each apartment) alone costing $5,000. The cost of the car or coach was about $13,000. It reflects much credit on Superintendent J. A. Holmes, who drafted the plan from the English railway carriage, while recently in Europe. The car is intended for the new popular New York route, via Newport— *Old Colony* (*Mass.*) *Memorial.*

[This car is neither good nor new. Twenty years ago cars precisely similar were used on the Harlem Railroad in this city, and we rode in them. Moreover it is in cars on this very plan that so many robberies and murders have occurred on English roads. American society may be much better than English, and with communication through each compartment safety may be assured to travelers, but they will hardly be popular.—Eds.

Velocity of Nervous Force.—By means of the chronoscope (veterinarian) M. Hirsch has come to the conclusion that nerves transmit their impressions at the rate of 34 meters per second. This is in a man, while M. Heinholtz estimates that in the motor nerves of a frog it is at the velocity of 190 feet per second.

Grass-cutting machines and horse-rakes have come into very general use this season. The use of these improved implements has had an effect in lessening the number of division fences, and many farmers have found out that there is no real profit in feeding down their mowing fields.

THE

Scientific American,

FOR 1864!

VOLUME ELEVEN,

NEW SERIES.

The publishers of the SCIENTIFIC AMERICAN respectfully give notice that the Eleventh Volume (New Series) commenced on July 2d, 1864. This journal was established in 1845, and is undoubtedly the most widely circulated and influential publication of the kind in the world. In commencing the new volume the publishers desire to call special attention to its claims as

A JOURNAL OF POPULAR SCIENCE.

In this respect it stands unrivaled. It not only finds its way to almost every workshop in the country, as the earnest friend of the mechanic and artisan, but it is found in the counting-room of the manufacturer and the merchant; also in the library and the household. The publishers feel warranted in saying that no other journal now published contains an equal amount of useful information; whil it is their aim to present all subiects in the most popular and attrac tive manner.

The SCIENTIFIC AMERICAN is published once a week, in convenient form for binding, and each number contains sixteen pages of useful reading matter, illustrated with

NUMEROUS SPLENDID ENGRAVINGS

of all the latest and best inventions of the day. This feature of the journal is worthy of special note. Every number contains from five to ten original engravings of mechanical inventions relating to every department of the arts. These engravings are executed by artists specially employed on the paper, and are universally acknowledged to be superior to anything of the kind produced in this country.

The publishers of the SCIENTIFIC AMERICAN promise to present, as during preceding years, all the latest improvements in Steam Engineering, War Vessels, Ordnance—military and naval—Fire-arms Mechanics' Tools, Manufacturing Machinery, Farm Implements, Wood-working Machinery, Water-wheels, Pumps and other Hydraulic Apparatus, Household Utensils, Electric, Chemical and Mathematical Instruments, Flying Machines and other Curious Inventions—besides all the varied articles designed to lighten the labor of mankind, not only in the shop and warehouse, but in every place where the industries of life are pursued.

From its commencement the SCIENTIFIC AMERICAN has been the earnest advocate of the rights of American Inventors and the

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In this important department, so vitally connected with all the great interests of the country, no other journal can lay any claim whatever, as in its columns there is published a weekly Official List of the "Claims" of all patents granted at the U. S. Patent Office.

THE PRACTICAL RECIPES

alone are oft-times worth more to the subscriber than the amount of a whole year's subscription.

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Specimen copies will be sent gratis to any part of the country.

Canadian subscribers will please to remit 25 cents extra on each year's subscription to pre-pay postage.

Munn & Co., Publishers,

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